BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

VOL. 14.] February 28, 1926. [No. 1.

DISEASES DUE TO PROTOZOAN PARASITES.

DIOS (R. L.) & ZUCCARINI (J. A.). **Primera comprobación de Tripanosomosis bovina en la R. Argentina.** [Bovine Trypanosomiasis in the Argentine.]—*Revista Med. Vet.* 1925. June. Sept. Vol. 8. No. 2-3. pp. 85–88. With 1 plate in colour.

The authors describe the detection of a large trypanosome of the *theileri* type in the blood of a 15-months-old bull inoculated experimentally with blood received from a ranch. The animal also developed babesia and anaplasma infections.

Attempts to transmit the trypanosome to other bovines failed, nor was it found possible to obtain cultures of it.

BEVAN (Ll. E. W.). **The Trypanosomiases of Man and Animals in Southern Rhodesia.**—*Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 536–546.

This paper is an introductory address at a Conference held at Salisbury, April 14th, 1925, to consider ways and means of dealing with tsetse flies and the diseases they transmit. It is in the nature of a statement of the problems involved.

CURASSON (G.). **Réactions à la trypanoléine de van Saceghem et formol-gélification dans la trypanosomiase à** *T. pecaudi.* [Van Saceghem's Trypanoleine and the Formol-gel Test in Animals infected with *T. pecaudi.*]—*Bull. Soc. Path. Exot.* 1925. Apr. Vol. 18. No. 4. pp. 352–353.

Curasson has tested a number of horses infected with and cured of *T. pecaudi*, and healthy horses with a material prepared in the manner described by VAN SACEGHEM and named by him trypanoleine. He finds that the reaction appears within an hour and disappears within 24 hours. It develops in exactly the same way in healthy, diseased, and recovered animals. It appears to be due simply to irritation. Exactly similar reactions can be produced with defibrinated blood and healthy horse plasma.

Curasson concludes that as a diagnostic agent trypanoleine is useless.

(K2858) Wt P.158/184 700 3/26 H & Sp Gp 52

He has also carried out the formol-gel test in a number of cases with the following results :—

Of five horses severely infected with *T. pecaudi*, four gave clear reactions in 4 to 24 hours.

Two animals in very poor condition which had been treated with "914" and galyl respectively and whose circulation was free from parasites gave clear reactions in a few hours.

A horse which during the course of three years had had at least ten acute crises of Souma gave no reaction when trypanosomes were discoverable in the blood by centrifuging. A rapid reaction was given, however, five days later after two injections of galyl when trypanosomes were not discoverable in the blood.

Of four healthy horses three gave no reaction, and one which had a strained tendon gave a rapid reaction.

Curasson concludes that the method is of little value.

CURSON (H. H.). **Vivax in the Bechuanaland Protectorate.** [MS. of a Note read at the Meeting of the S. African Assoc. for the Advancement of Science. July 8th, 1925.]

The writer has detected *T. vivax* in a blood smear sent from Maun, Bechuanaland. *T. congolense* was identified in a smear from Kasungulu. Flies forwarded with the smears were found to be *G. morsitans*.

SOULE (M. H.). **Microbic Respiration. III. Respiration of** *Trypanosoma lewisi* **and** *Leishmania tropica.*—*Jl. Infect. Dis.* 1925. Mar. Vol. 36. No. 3. pp. 245–308.

The strain of *L. tropica* was obtained from the Rockefeller Institute and had passed through over 200 generations in the author's laboratory.

Full details are given of the technique of the cultivation of the organisms and of the analyses of the gases.

It was found that in tubes of a given size cultures of *L. tropica* consumed all the oxygen about twice as rapidly as those of *T. lewisi*. The latter parasite was the more susceptible to increasing partial pressures of oxygen. The organisms were not killed but their multiplication was inhibited.

A concentration of 50 per cent. was the critical point for *L. tropica*. Oxygen was necessary for growth, but atmospheres of nitrogen or hydrogen were not lethal.

A concentration of CO_2 higher than 20 per cent. was toxic for *T. lewisi*, even when oxygen was present, but with *L. tropica* partial pressures of 30 per cent. or more were required to produce toxic effects. True respiratory quotients were only obtainable with young cultures, as secondary changes in the medium caused alterations later.

DIOS (R. L.), ZUCCARINI (J. A.) & OYARZABAL (F.). **Nouveau cas de trypanosomiase humaine dans l'Argentine.** [A New Case of Human Trypanosomiasis in the Argentine.]—*C.R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1114–1115.

This is the third case reported by the authors. The blood of a boy, 4 years old, was found to contain *Schizotrypanum cruzi*. The clinical symptoms described by CHAGAS were not observed, but certain symptoms were noted which were ascribed to infestation with worms.

BRITISH MUSEUM

Trypanosomes were found in rats and dogs inoculated with blood, but in small numbers only. Guineapigs did not become infected.

The cerebro-spinal fluid was negative both by examination and inoculation.

YORKE (Warrington). **Co-ordination of Effort in Tsetse-Fly Investigations.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 373–379. [A paper read at the Second Imperial Entomological Conference, London, June 15, 1925.]

Four factors are concerned in the problem of Trypanosomiasis of man and domesticated animals: (1) The trypanosomes; (2) population and domestic stock; (3) the transmitting agent; and (4) the reservoir. All the above factors should be investigated at the same time and in the same locality.

The work must be carried on systematically through periods of years with close co-ordination if results are to be obtained. Many investigators are working in more or less isolation at different aspects of the problem. Their resources are limited, and the work is often brought to a complete standstill as a result of transference to another area or duty. The result is incomplete investigation and waste of time, money, and energy.

The author urges, as he has done before: (1) That effort should be concentrated; (2) that entomological, medical, and veterinary research should be under one central organisation; (3) the personnel should be sufficiently large to cover leave substitutes, the possibilities of illness, etc.; (4) the funds should be sufficient to allow of the employment of adequate native labour to enable experimental work to be carried out on a large scale.

KINGHORN (A.). **Human Trypanosomiasis in the Luangwa Valley, Northern Rhodesia.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 281–300.

The author deals with the physical aspects of the Valley, the distribution of the game and fly, the history of sleeping sickness, the incidence of the disease, the disease in human beings, treatment with "Bayer 205," and prophylaxis.

The evidence suggests that the waterbuck should be looked upon with suspicion. The fly, like the game, shows a seasonal variation of distribution. During the rains it spreads over the country, but during the dry season it is abundant near streams and hence near villages. As the villages are generally surrounded by gardens the fly does not, as a rule, invade them.

The disease was first detected in Europeans about 1909, but there is no evidence to suggest that the disease ever becomes an epidemic. The author believes, as do the natives, that the disease is an old one and not of recent introduction.

In human beings the period of incubation is between one and two weeks, and the disease rarely occurs in children under 15 years of age. Figures appear to show an increasing susceptibility up to about 35 years and then a decline. The disease is more common in women than men in the proportion of 3 to 2.

There is no evidence of the acquisition of immunity.

Of 38 cases treated with "Bayer 205" by the Commission in 1922, only 5 remain alive, but it is not certain that trypanosomiasis was

He has also carried out the formol-gel test in a number of cases with the following results :—

Of five horses severely infected with *T. pecaudi*, four gave clear reactions in 4 to 24 hours.

Two animals in very poor condition which had been treated with "914" and galyl respectively and whose circulation was free from parasites gave clear reactions in a few hours.

A horse which during the course of three years had had at least ten acute crises of Souma gave no reaction when trypanosomes were discoverable in the blood by centrifuging. A rapid reaction was given, however, five days later after two injections of galyl when trypanosomes were not discoverable in the blood.

Of four healthy horses three gave no reaction, and one which had a strained tendon gave a rapid reaction.

Curasson concludes that the method is of little value.

CURSON (H. H.). **Vivax in the Bechuanaland Protectorate.** [MS. of a Note read at the Meeting of the S. African Assoc. for the Advancement of Science. July 8th, 1925.]

The writer has detected *T. vivax* in a blood smear sent from Maun, Bechuanaland. *T. congolense* was identified in a smear from Kasungulu. Flies forwarded with the smears were found to be *G. morsitans*.

SOULE (M. H.). **Microbic Respiration. III. Respiration of** *Trypanosoma lewisi* **and** *Leishmania tropica.*—*Jl. Infect. Dis.* 1925. Mar. Vol. 36. No. 3. pp. 245–308.

The strain of *L. tropica* was obtained from the Rockefeller Institute and had passed through over 200 generations in the author's laboratory.

Full details are given of the technique of the cultivation of the organisms and of the analyses of the gases.

It was found that in tubes of a given size cultures of *L. tropica* consumed all the oxygen about twice as rapidly as those of *T. lewisi*. The latter parasite was the more susceptible to increasing partial pressures of oxygen. The organisms were not killed but their multiplication was inhibited.

A concentration of 50 per cent. was the critical point for *L. tropica*. Oxygen was necessary for growth, but atmospheres of nitrogen or hydrogen were not lethal.

A concentration of CO_2 higher than 20 per cent. was toxic for *T. lewisi*, even when oxygen was present, but with *L. tropica* partial pressures of 30 per cent. or more were required to produce toxic effects. True respiratory quotients were only obtainable with young cultures, as secondary changes in the medium caused alterations later.

DIOS (R. L.), ZUCCARINI (J. A.) & OYARZABAL (F.). **Nouveau cas de trypanosomiase humaine dans l'Argentine.** [A New Case of Human Trypanosomiasis in the Argentine.]—*C.R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1114–1115.

This is the third case reported by the authors. The blood of a boy, 4 years old, was found to contain *Schizotrypanum cruzi*. The clinical symptoms described by CHAGAS were not observed, but certain symptoms were noted which were ascribed to infestation with worms.

BRITISH MUSEUM

Trypanosomes were found in rats and dogs inoculated with blood, but in small numbers only. Guineapigs did not become infected.

The cerebro-spinal fluid was negative both by examination and inoculation.

YORKE (Warrington). **Co-ordination of Effort in Tsetse-Fly Investigations.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 373–379. [A paper read at the Second Imperial Entomological Conference, London, June 15, 1925.]

Four factors are concerned in the problem of Trypanosomiasis of man and domesticated animals: (1) The trypanosomes; (2) population and domestic stock; (3) the transmitting agent; and (4) the reservoir. All the above factors should be investigated at the same time and in the same locality.

The work must be carried on systematically through periods of years with close co-ordination if results are to be obtained. Many investigators are working in more or less isolation at different aspects of the problem. Their resources are limited, and the work is often brought to a complete standstill as a result of transference to another area or duty. The result is incomplete investigation and waste of time, money, and energy.

The author urges, as he has done before: (1) That effort should be concentrated; (2) that entomological, medical, and veterinary research should be under one central organisation; (3) the personnel should be sufficiently large to cover leave substitutes, the possibilities of illness, etc.; (4) the funds should be sufficient to allow of the employment of adequate native labour to enable experimental work to be carried out on a large scale.

KINGHORN (A.). **Human Trypanosomiasis in the Luangwa Valley, Northern Rhodesia.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 281–300.

The author deals with the physical aspects of the Valley, the distribution of the game and fly, the history of sleeping sickness, the incidence of the disease, the disease in human beings, treatment with "Bayer 205," and prophylaxis.

The evidence suggests that the waterbuck should be looked upon with suspicion. The fly, like the game, shows a seasonal variation of distribution. During the rains it spreads over the country, but during the dry season it is abundant near streams and hence near villages. As the villages are generally surrounded by gardens the fly does not, as a rule, invade them.

The disease was first detected in Europeans about 1909, but there is no evidence to suggest that the disease ever becomes an epidemic. The author believes, as do the natives, that the disease is an old one and not of recent introduction.

In human beings the period of incubation is between one and two weeks, and the disease rarely occurs in children under 15 years of age. Figures appear to show an increasing susceptibility up to about 35 years and then a decline. The disease is more common in women than men in the proportion of 3 to 2.

There is no evidence of the acquisition of immunity.

Of 38 cases treated with "Bayer 205" by the Commission in 1922, only 5 remain alive, but it is not certain that trypanosomiasis was

responsible for the deaths of all the others. Influenza may have played a part. Three doses of 1·2 g. were given at 10–18 days interval. Increased doses might have been more effective, but with the cost of the drug at 6s. 6d. per gramme larger doses would be prohibitive.

The attitude taken up by the native is one of passive resistance, and the writer does not think that it is practicable to treat the whole of the population and kill off all the game, as would have to be done if the trypanosome is a game parasite and not one of human beings only.

VAN SACEGHEM (R.). **Le bismuthoidol dans le traitement des trypanosomiases animales.** [Bismuthoïdol in the Treatment of Trypanosomiasis of Animals.]—*C.R. Soc. Biol.* 1925. Oct. 30. Vol. 93. No. 30. pp. 1046–1049.

Bismuthoïdol is finely divided colloidal bismuth rendered isotonic in solution with sugar. The author has used it for intravenous injection only.

Doses of 20 to 50 cc. have been given and the paper contains details of seven bovines placed under treatment. Four of these were infected with *T. cazalboui* var. *vivax*, two with *T. congolense pecorum*, and one with *T. brucei*. In the latter animal only did trypanosomes disappear from the circulation.

Further experiments could not be carried out as supplies of the drug were not available.

NICOLAU (S.), DOSKOCIL (A.) & GALLOWAY (I. A.). **Action de l'acétyloxyaminophénylarsinate basique de bismuth dans le nagana expérimentale et la spirillose des poules.** [The Action of Basic Acetyloxyaminophenylarsenate of Bismuth in Experimental Nagana and Fowl Spirillosis.]—*C.R. Soc. Biol.* 1925. Aug. 14. Vol. 93. No. 27. pp. 580–582.

The drug has been used as a suspension in oil containing 0·041 g. of bismuth, and 0·015 g. of arsenic per cc.

If 0·5 cc. or more of the suspension is injected subcutaneously into a mouse up to 48 hours after infection with nagana, when trypanosomes are numerous in the blood, a definite cure is effected. In 3 cases given the periods of observation were 92, 45, and 63 days.

A dose of 0·3 cc. given at the same time as the infective inoculation prolongs the period of incubation, but does not prevent infection.

A rabbit was given 2 cc. of a 10 per cent. suspension of the drug into the muscles of the back, and at the same time was infected by instillation of trypanosomes into the eye and was not infected, while a control succumbed in 9 days.

If treatment is postponed until 2 days after infection, less favourable results are obtained.

The drug appeared to be more effective as a spirillicide than as a trypanosomicide. 1 cc. per kilog. injected into fowls 2 days prior to inoculation prevented infection. 0·5 cc. was found to cut short infection, but with 0·2 cc. the disease ran a normal course.

If there is a delay of four days between the injection of the drug and infective inoculation the results are rather better, as in this case 0·5 cc. prevents infection. 0·2 cc. again fails to prevent the disease from running a normal course.

Dios (R. L.). **Ensayos de tratamiento preventivo y curativo con "Bayer 205."** ["Bayer 205" in the Curative Treatment and Prophylaxis of Trypanosomiasis (Mal de Caderas).]—*Revista Med. Vet.* 1925. June. Sept. Vol. 8. Nos. 2-3. pp. 89–93.

In his English summary the author states that very satisfactory results have been obtained, but it appears to be permissible to question this on the grounds of the details given of cases treated. One infected horse was treated, receiving a total quantity of 17 grammes in the course of 4½ months. Four relapses occurred and the animal died.

Berg (H.). **Die Eignung von "Bayer 205" zur Bekämpfung der afrikanischen Haustiertrypanosomen.** [The Treatment of Trypanosomiasis of Domesticated Animals in Africa with "Bayer 205."]—*Deut. Tierärzt. Wochenschr.* 1925. Vol. 33. No. 34. pp. 561–571.

Twelve oxen, ranging in weight from 225 to 330 kilogs., were given doses of 10–25 gm. of "Bayer 205" in 10 per cent. watery solution. Two days later they were exposed to natural infection in a fly belt. Half the animals were left there for 17 days, and the remainder for 31 days. All contracted trypanosomiasis. Abscesses developed in many of the animals at the seat of the subcutaneous injections. Eleven naturally-infected animals were treated with doses ranging from 5 to 30 gm. of the drug, and in some cases repeated doses were given. The maximum amount received by any animal was 52 grammes spread over a period of 5 weeks. All died of nagana. Twelve animals ranging in weight from 150 to 300 kg. were given doses of 10 to 30 gm. of the drug intravenously, and 5 days later they were exposed to the bites of flies. After 6 days, and after further intervals of 10 days, they received doses of 10–30 gm. and 2–3 gm. (twice) intravenously. Eight of these animals died, apparently as the result of poisoning with the drug. One which survived became infected, and the other three remained free from trypanosomes. Since the medicinal dose appears to approximate so closely to the toxic dose by intravenous injection, it appears to be impracticable to use the drug in this way.

These experiments were carried out in a fly belt, and the test was therefore the severest possible.

It is pointed out the fly land can be divided into three classes: (1) The actual fly belts; (2) heavily infested farms; and (3) lightly infested farms. The next experiments were therefore carried out in a place falling into the second category, and in some cases the "Bayer 205" was used in conjunction with tartar emetic.

Sixteen animals were treated with "Bayer 205" alone, 3 with tartar emetic, 13 with the two drugs, and 16 were kept as controls.

The combined drugs were prepared for injection as follows. One gram of tartar emetic was dissolved in 40 cc. of water and "sterilised for half an hour." The solution was cooled to about 60° C., and the "Bayer 205" was then added. Immediate solution took place.

The animals were injected with doses ranging from 2·5 to 10 grammes of "Bayer 205," and with 1 to 1·5 gm. of tartar emetic, usually by the intravenous path. They were then exposed to the bites of flies.

Of those treated with "Bayer 205" alone, 33⅓ per cent. failed to become infected. The same percentage of those treated with tartar emetic excaped infection. Of those treated with the combined

drugs 69 per cent. escaped infection. The control animals all became infected. The doses were administered every fortnight from December to May (the fly season).

The control animals of this experiment, which all became infected, were subsequently used for curative treatment.

KNOWLES (R. H.). **Treatment of Camels affected with *Trypanosoma soudanense* with "Bayer 205," and Further Observations on the Formol-gel Test.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 42–46.

The drug was used in 10 per cent. solution and was administered intravenously by gravitation. No precautions regarding the rate of administration were taken. In view of the production of albuminuria in the human subject samples were collected daily up to a period of 7 days after the last dose and tested for albumen. None was found.

The experimental treatments were controlled by microscopic examination of the blood, biological tests, and the formol-gel test.

The blood was examined twice daily for at least ten days before treatment, and for three months after.

Gerbils were inoculated with the camels' blood before and after treatment.

The formol-gel test was applied before treatment in two cases only as it had not been devised when treatment of the others began.

Two camels known to be infected a month before treatment received 3 doses of 6 grammes each with 1-day intervals. No trypanosomes could be found 8 and 9 months after treatment, and condition was greatly improved. A similar result was obtained in a camel when two doses of 8 grammes each were given. Three were given 10 grammes in a single dose. One died of enteritis 6 months later, but it was then apparently free from trypanosomiasis, the others were free 7½ and 9 months after treatment and had improved in condition.

Tests showed that after treatment with "Bayer 205" the serum of camels tends to lose the power of giving the formol-gel reaction, but the significance of this and the connection between this and cure requires further investigation.

It is notable that all the camels returned to working condition and were put to work three months after treatment. A single dose of 10 grammes was apparently effective.

DONATIEN (M.). **Les Piroplasmoses bovines en Algerie.** [The Bovine Piroplasmoses in Algeria.]—*Rev. Vét.* 1925. Aug. Vol. 77. No. 8. pp. 474–483.

This paper is a summary which previously appeared in the *Annales de l'Institut Pasteur* [see this *Bulletin*, Vol. 12, No. 3, pp. 82–84].

GALLI-VALERIO (B.). **La Piroplasmiase des Bovidés dans la plaine du Rhône.** [Bovine Piroplasmosis in the Rhone Plain.]—*Schweiz. Arch. f. Tierheilk.* 1925. Aug. 31. Vol. 67. No. 16. pp. 397–398.

The author has had the opportunity of examining blood smears from an ox and a heifer affected with haemoglobinuria near Collombey, on the left bank of the Rhone. Parasites were present in considerable numbers. They occurred singly and in pairs in the corpuscles. Single

parasites were generally disposed diametrically in the corpuscles, but the pairs were placed almost invariably along the edge, thus forming a wide angle between them. Rounded or ring forms were rarely encountered in the smears. In Giemsa stained preparations the thicker end showed a vacuole-like space and a large mass of chromatin.

The parasite is identified as *P. bovis*. The transmitting agent was *I. ricinus*, of which a large number were collected from the animals.

GAUPILLAT (M.) & NEVEUX. **Existence d'un foyer autochtone de piroplasmose équine à *Piroplasma caballi* en Haute-Marne.** [A Centre of Equine Piroplasmoses due to *P. caballi* in Haute Marne.] —*Ann. Parasit. Hum. et Comp.* 1925. Oct. Vol. 3. No. 4. pp. 375–383. With 1 text fig.

The authors record a second centre of equine piroplasmosis. Seven cases have been diagnosed by microscopic examination. They have collected *Dermacentor reticulatus* from horses healthy and sick and from dogs. Trypanblue was found to be efficacious.

KOHANAWA (C.) & OGURA (K.). **On a Piroplasmosis-like Disease of Cattle in Sapporo and its Neighbourhood.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Sept. Vol. 4. No. 3. pp. 322–323. [Authors' English Abstract.]

The disease has been known to exist for several years, particularly at the Makomanai Breeding Establishment. It is characterised by fever, anaemia, icterus, haemoglobinuria, and changes in the blood corpuscles, but the anaemia and cellular changes are the only symptoms constantly present. The condition is said to be identical with neither Texas fever nor East Coast fever; in fact, the authors say that they are not in a position to state definitely that the intracorpuscular parasites are certainly responsible for the symptoms for the reasons that they "have often found that healthy cattle have rather more parasites in the blood than diseased animals. As is proved by inoculation experiments with blood of infected cattle into healthy ones, the transmission of the piroplasm and invasion of the disease does not always go hand in hand."

Their experiments with trypanblue are inconclusive as yet, but they incline to the view that it is of no value for the treatment of the condition, and that, in fact, it may do harm.

CÉSARI (E.). **La Leishmaniose Canine.** [Canine Leishmaniasis.]—*Rev. Gén. Méd. Vét.* 1925. Nov. 15. Vol. 34. No. 407. pp. 613–632.

Canine leishmaniasis was first detected by NICOLLE in Tunis in 1908, and within a short time it was found to have a distribution parallel with the human disease on the Mediterranean littoral. The investigations carried out by others appear to indicate that visceral leishmaniasis of the dog has a distribution parallel with that of infantile leishmaniasis, while cutaneous canine leishmaniasis, regarding which little is known, appears to be found where oriental sore occurs in man.

Visceral leishmaniasis of the dog occurs along the north of Africa, in Southern Europe, and to a small extent in Western Asia. It has never been detected in America and Oceania. The parasites are

obtainable in culture where they assume a flagellate form. Morphologically and culturally no differences can be detected between the various parasites that have been found. They are distinguished solely on epidemiological and clinical grounds.

In the dog acute and chronic forms of infection occur.

In the acute form it is not improbable that there has been infection prior to the onset of marked symptoms, since such cases generally occur in animals that have been losing condition for some time. The acute symptoms are febrile attacks, enlargement of the abdomen which is associated with pain on manipulation, stiffness of gait, in some cases paralysis of the hind legs, and a certain amount of anaemia.

In the chronic form onset passes unnoticed, but subsequently the following lesions are observed; marked emaciation, loss of hair round the eyes and on the ears. These subsequently become covered with scabs and are very resistant to treatment. The degree of anaemia varies from case to case. Manipulation reveals enlargement of the liver. There may be ulceration of the lips and keratitis.

At the post-mortem the tissues involved are found to be principally the liver, spleen, and bone-marrow. In acute cases the spleen is blackish and softened, and shows infarcts and haemorrhages. In such cases death is not uncommonly due to rupture of this organ. In cases in which death is delayed there is thickening of the capsule and general sclerosis of the pulp. Similarly, in the more chronic cases there is cirrhosis of the liver. The bone-marrow usually appears as a red jelly which is devoid of fat, but it may be yellow and oily, with haemorrhagic areas scattered through it.

During life, should blood examination prove negative recourse should be had to liver puncture and trephination of the tibia or femur. Should microscopic examination prove negative cultures should be made on N.N.N. medium. Experimentally, the infection can be transmitted to the dog, jackal, monkey, dormouse, and white mouse. Guineapigs, rabbits and rats are resistant, as also are birds and cold-blooded animals. In the dog the experimentally-transmitted disease is usually less severe than that contracted naturally, and recovery is the rule, and inoculation with culture is a less certain method of infection than inoculation with infected tissue substance. In culture the organism loses virulence. In any case inoculation must be intraperitoneal or intrahepatic. Subcutaneous inoculation always fails.

The method of transmission is still undetermined.

While the facts available appear to indicate that visceral canine leishmaniasis and infantile leishmaniasis are identical, proof has not as yet been furnished.

Atoxyl and arsenophenylglycine have been tried by Nicolle and Comte for the treatment of experimental leishmaniasis in the dog, but without success.

Tartar emetic administered intravenously in 1 per cent. solution appears to be very valuable.

In the absence of information as to the method of infection little can be done prophylactically.

Row (R.). **Canine Leishmaniasis in Bombay.**—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. pp. 317–318. With 5 text figs.

The dog was from the N.W. Frontier, and was found to have extensive ulcers on the lips, ears, nose and inner canthus of the left eye. There were also non-ulcerated pea-like nodules in the ears.

The presence of leishmania was confirmed by microscopic examination, and they appeared to resemble *L. tropica*, but were slightly larger than those seen in man. The cytoplasm appeared to be less dense, and the rod-like micronucleus was always placed at an angle to the diameter of the nucleus. Flagellation did not take place in N.N.N., nor in Row's haemoglobin saline prepared with rabbit blood. Dogs' blood might have yielded better results.

Attempts to infect mice by intraperitoneal inoculation failed, but two pariah dogs were infected cutaneously in the ear. These cases healed spontaneously.

PHADKE (V. R.) & SHAIKH (A. I.). **Cutaneous Leishmaniasis in a Dog.**—*Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 560–567. With 4 text figs.

A mongrel bull terrier puppy, nine months old, which had been brought down from Peshawar six weeks previously, was admitted to hospital in Bombay showing ulcers on the upper lips, both ears, a hind paw and sternum.

Microscopic examination of scrapings from the edges of the ulcers showed Leishman-Donovan-like bodies.

The animal was in fair condition, its temperature was normal, and appetite good. A prolonged search failed to reveal any ectoparasites of any kind. In scrapings from the lesions the parasites were found for the most part within large mono-nuclear cells, but scattered individuals were also seen.

Treatment was continued for four months before a cure was effected. Internally, liquor arsenicalis was first used, and this was afterwards replaced by mercuric cyanide. Locally chloral hydrate, carbolic acid and tincture of iodine were used in combination, this being replaced by a dry dressing of arsenate of iron. Occasionally, the ulcers were dressed with hydrogen peroxide and nitrate of silver.

Two dogs inoculated experimentally by scarification developed lesions in from 6 to 7 weeks. These were limited to the inoculated areas and healed spontaneously.

JAKIMOW (W.) & WASSILEWSKAJA (W.). **Über die Methode der Untersuchung der Oocysten der Coccidien.** [The Methods of Detecting Coccidial Oocysts.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 83.

The authors claim to have discovered independently the value of salt solution for the detection of oocysts.

KOLPAKOWA (T.). **Über die Rolle des Magensaftes bei der natürlichen Immunität der Kaninchen bei der Coccidiose.** [The Part Played by the Gastric Juice in the Natural Immunity of the Rabbit against Coccidiosis.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. pp. 83–84.

Test-tube experiments were made in which material which was rich in oocysts was mixed with gastric and intestinal juice, pancreatic secretion and bile. Control tubes containing water and salt solution were used. Some of the tubes were incubated at 30–35° C., and some were left at room temperature. Sporogony began in the water,

physiological salt solution, and in some cases in gastric juice in 16–20 hours in the incubator and 2–3 days at room temperature. Sporogony was not observed in the tubes containing pancreatic juice, intestinal juice and bile.

JAKIMOW (W.), WASSILEWSKAJA (W.), MARKOWA (E.), & RASTEGAEWA (E.). **Über die Coccidiose der Schweine in Russland.** [Porcine Coccidiosis in Russia.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 84.

The examination of 104 pigs showed that 40 per cent. were infected.

JAKIMOW (W.). **Über die Periode des Heranreifens der Eier der** *Eimeria stiedae.* [The Period required for the Maturation of the Oocysts of *Eimeria stiedae.*]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 84.

In a suspension of faeces in a thin layer at room temperature the author found a single oocyst in which sporoblast formation had occurred at 24 hours. After 48 hours, 20 per cent. of the oocysts had undergone segmentation.

BEVAN (Ll. E. W.) & KINGCOME (Martin H.). **An Outbreak of Bovine Coccidiosis in Southern Rhodesia.**—*Jl. Comp. Path. & Therap.* 1925. Dec. Vol. 38. Pt. 4. pp. 292–294. With 1 text fig.

A number of deaths were reported in a herd of yearling grade-Herefords in April, shortly after exceptionally heavy rains. Inspection of the herd showed that a number of the animals were unthrifty and anaemic, and some had diarrhoea. Post-mortem revealed the usual lesions of general anaemia and unthriftiness.

At a further post-mortem the following lesions were found: Great thickening of the mucous membrane of the first portion of the small intestine ($\frac{3}{8}$ inch) the surface being covered with a thick, glairy material which was not readily removed by scraping. The mucous membrane of the terminal portion of the large intestine was similarly thickened. Examination for acid-fast bacteria was negative. Coccidia, it is stated, were not recognized until dark ground illumination was resorted to, when developmental forms of the parasite were detected.

Although the affected animals were removed repeatedly from one camp to another, the disease persisted well on into the dry weather.

DELAMARE (G.). **Pseudo-tubercules coccidiens du foie de lapin.** [Pseudo-Tubercles due to Coccidia in the Liver of a Rabbit.]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 633–634.

Four distinctly nodular lesions were found in the portal fissure of the liver of a rabbit. They were composed of a central mass of coccidia, a zone of embryonic tissue and, externally, a fibrous capsule. In the cellular zone masses of yellowish pigment, insoluble in alcohol or xylol, were found either free or in the interior of macrophages. Giant cells containing pigment were also present.

RUPPERT (I.), ROTTCARDT (A.) and SCASSO (R.). **La coccidiosis de los caprinos en la República Argentine.** [Caprine Coccidiosis in the Argentine.]—*Revista Med. Vet.* 1925. June-Sept. Vol. 8. Nos. 2-3. pp. 64–79. With 12 figs.

The authors describe the clinical picture of the disease and figure and describe the parasite involved. Emphasis is laid upon the necessity of examination of the faeces for the establishment of a diagnosis.

The disease, which runs a chronic course, may prove fatal.

The paper concludes with an extensive bibliography.

THOMSON (J. G.) & ROBERTSON (A.). **Notes on the Cultivation of Certain Amoebae and Flagellates of Man, using the Technique of Boeck and Drbohlav.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. Vol. 28. No. 19. pp. 345–349. With 2 text figs.

The authors have confirmed the results obtained by BOECK and DRBOHLAV. They have also succeeded in cultivating *Dientamoeba fragilis, Endolimax nana* and *Iodamoeba bütschlii,* but experimental infection of kittens failed. The addition of a small quantity of sterile human faeces to the medium has permitted the cultivation of *Trichomonas hominis, Chilomastix mesnili,* and *Tricercomonas intestinalis.*

GUÉRIN (F. H.) & PONS (R.). **Culture d'***Entamoeba dysenteriae* **par le procédé de W. C. Boeck et Jaroslav Drbohlav.** [The Cultivation of *Entamoeba dysenteriae* by the Boeck and Drbohlav Technique.] —*Bull. Soc. Path. Exot.* 1925. July 8. Vol. 18. No. 7. pp. 517–520.

The authors confirm the results published by the originators of the technique.

DRBOHLAV (J. J.). **Une nouvelle preuve de la possibilité de cultiver** *Entamoeba dysenteriae* **Type** *histolytica.* [A New Proof of the Possibility of cultivating *Entamoeba dysenteriae,* Type *histolytica.*] —*Ann. Parasit. Hum. et Comp.* 1925. Oct. Vol. 3. No. 4. pp. 349–357.

The author summarizes his various attempts to obtain media suitable for the cultivation of amoebae.

The best media for conservation were agar prepared with Ringer's solution, and agar prepared with N.N.N. agar made up with Ringer to 1·4 per cent., the Ringer containing a regulator and having a pH of 7·4, and the same medium containing 1 per cent. starch. It was by chance found that the addition of 1 per cent. dextrin to the Ringer solution used for preparing the solution of egg albumen used for covering the cultures prevented the development of blastocystis.

An N.N.N. medium containing blood and heated to 100° C. for 30 minutes may be used both for isolation and conservation.

YAKIMOFF (W. L.) & MILLER (G. A.). **Les protozoaires de l'intestin des rats d'égout.** [The Intestinal Protozoa of Sewer Rats.]—*Bull. Soc. Path. Exot.* 1925. Apr. 8. Vol. 18. No. 4. pp. 311–312.

Entamoeba muris has been found in 9 per cent. of the sewer rats examined in Petrograd, *Trichomonas muris* in 18·1 per cent., and spirochaetes in 54·5 per cent.

PATAY (R.). **Sur l'extension aux flagellés d'un fixateur de Noguchi pour Spirochètes.** [The Application to Flagellates of a Fixing Agent devised by Noguchi for Spirochaetes.]—*Bull. Soc. Path. Exot.* 1925. Apr. 8. Vol. 18. No. 4. pp. 305–306.

The fixative may be employed upon wet or dry films, preferably the latter. As it destroys red blood corpuscles it is valuable for the examination of thick smears for protozoa. The author states that he has used it successfully for trypanosoma, spirochaeta, giardia, octomitus, trichomonas, and trichomastix. The solution is prepared as follows :—

$\frac{N}{15}$ di-sodium phosphate—88 parts.

$\frac{N}{15}$ Mono-potassium phosphate—12 parts.

Of this solution, 9 parts have added to them 1 part of commercial formalin. The solutions are mixed at the time of use as the mixture remains potent for only 2–3 weeks at room temperature.

DESCHIENS (R.). **Kystes de *Giardia* sp. observés chez le lion** (*Felis leo*). [Giardia Cysts in *Felis leo*.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1065–1066.

Cysts of giardia were found in the faeces of two lions in Paris. The fixed cysts measured 10–12·5μ by 6·5–7·5μ. Two cats were fed with the faeces, but failed to become infected.

There is not sufficient information available to form an opinion as to whether the species is new or one of the three already described in carnivora.

NIESCHULZ (O.) & KRIJGSMAN (B. J.). **Über *Giardia simoni* Lavier.** [*Giardia simoni* Lavier.]—*Arch. f. Protist.* 1925. Vol. 52. No. 1. pp. 166–169. With 2 text figs. & 2 curves.

The authors describe *Giardia simoni*, which they found in *Mus. norvegicus*, and a white rat in Holland.

PANISSET (L.) & VERGE (J.). **Les Spirochétoses du Chien.** [The Spirochaetoses of the Dog.]—*Rev. Gén. Méd. Vét.* 1925. Oct. 15. Vol. 34. No. 406. pp. 555–561.

This paper is a summary of the information gathered from existing literature and it concludes with a bibliography.

GALLOWAY (I. A.). **Cultures *in vitro* de *Spirochaeta duttoni* et de *Spirochaeta gallinarum*.** [Artificial Cultivation of *S. duttoni* and *S. gallinarum*.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1074–1076.

Egg-white is placed in test tubes and coagulated over a water bath in a slanting position. 5 cc. of rabbit serum diluted 1 to 5, or horse serum diluted 1 to 10, and heated for an hour at 58–60° C. is then introduced and finally a layer of liquid paraffin. The addition of a drop of fresh rabbit, monkey, or human blood favours growth. The optimum temperature is 30–32° C.

S. gallinarium has been carried through 18 generations in 65 days, using horse serum. Only a very small drop of blood should be used for inoculating the primary tube and for carrying on succeeding generations, as otherwise degeneration forms became numerous. 0·1 cc. should be used for this purpose. Growth goes on for four or five days and the degeneration begins. In certain tubes, when external conditions are not favourable, agglutination precedes degeneration. But when conditions are favourable collections of very mobile parasites resembling actual colonies may be found.

CASSAMAGNAGHI (A.). **Comunicacion previa sobre la constatacion de espiroquetas en un bovino.** [Preliminary Note regarding the Occurrence of a Spirochaete in Bovines.]—*Ass. rural del Uruguay.* 1924. Vol. 53. Ex. *Bull. Inst. Pasteur.* 1925. Aug. 31. Vol. 23. No. 16. p. 714.

The author describes a spirochaete having the characters of *S. theileri*. It is transmitted by *B. microplus*. It is not in itself responsible for illness, but it may aggravate conditions due to other parasites.

IVANOFF (E.). **Le sort des trypanosomes (*T. brucei* et *T. pecaudi*) dans la cavité générale de *Galleria mellonella*.** [The Fate of *T. brucei* and *T. pecaudi* in the Body Cavity of *Galleria mellonella*.]—*C. R. Soc. Biol.* 1925. Aug. 14. Vol. 93. No. 27. pp. 571–572.

DISEASES DUE TO METAZOAN PARASITES.

WITENBERG (G.). **Notes on Strongylidae of Elephants.**—*Parasitology.* 1925. Aug. Vol. 17. No. 3. pp. 284–294. With 22 text figs.

Among the parasites figured and described are the following new species: *Murshidia lanei, Pterygopharynx neveu-lemairei.*

CHANDLER (A.). **A Contribution to the Life-History of a Gnathostome.**—*Parasitology.* 1925. Aug. Vol. 17. No. 3. pp. 237–244. With 6 text figs.

The author described work done with gnathostomes found in snakes from the Calcutta Zoological Gardens. The cysts containing larvae were found in the mesentery. They were yellow and opaque and

measured from 0·95 to 1·2 mm. The contained coiled larvae measured from 3–3·86 mm. Feeding experiments were carried out with cats, a rat and guineapigs. Most of the cats died in from 2 to 10 days, presumably from the infection, and young gnathostomes were recovered. The majority of these were found burrowing in the liver. The parasites were similar to those obtained from the snakes, but were larger. No further development occurred up to four weeks after feeding.

Ten per cent. of cats not fed were found to harbour similar parasites.

SMIT (H. J.) & IHLE (J. E. W.). *Filaria spirovoluta*, **ein neuer Nematode aus dem Bindegewebe des Pferdes.** [*Filaria spirovoluta*, a New Nematode from the Connective Tissue of the Horse.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1925. Aug. 15. Vol. 96. No. 1. pp. 30–32. With 1 fig.

The parasite was found in the loose connective tissue beneath the deep pectoral muscles of a horse. Three females were found. They could be removed from the tissues readily while fresh. They varied in length from 95 to 132 mm.

The parasite is figured and described.

WARE (F.). **On a Collection of Helminths from Domesticated Animals in Mauritius.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. p. 41.

The parasites identified were collected from domesticated animals, but it is not known whether these were imported or native. The parasites were : *Belascaris marginata*, *Dirofilaria immitis*, *Stephanurus dentatus*, *Eurytrema pancreaticum*, *Fasciola hepatica*, and *Cotylophoron cotylophorum*.

WARE (F.). **On a Nematode of the Genus Ostertagia.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 38–41. With 3 text figs.

The author describes a parasite which he names *Ostertagia asymmetrica*, sp. nov., found in the abomasum of a fallow deer (*Cervus dama*) in England.

BAYLIS (H. A.). **On the Identity of** *Heterakis neoplastica*, **Wassink.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 362–364.

Comparative measurements lead the author to believe that *H. neoplastica* is identical with *H. isolouche* von Linstow, 1906.

BAYLIS (H. A.). **On the Identity of** *Gongylonema subtile* **Alessandrini.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 361–362.

Baylis believes, as a result of measuring ALESSANDRINI'S specimens, that *G. subtile* is identical with *G. pulchrum*.

BAYLIS (H. A.). **On the Species of Gongylonema (Nematoda) Parasitic in Ruminants.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 46–55. With 5 text figs.

The author describes *G. pulchrum* (=*G. scutatum*) with a view to bringing into prominence the differences between it and *G. verrucosum*. The intermediate host of *G. pulchrum* is probably to be found among dung beetles and cockroaches.

G. verrucosum, which has up to the present been found in India only, is described, and a table gives the measurements of the two parasites. The intermediate host is unknown.

BAYLIS (H. A.), PAN (T. C.) & SAMBON (Juliet E. B.). **Some Observations and Experiments on *Gongylonema* in Northern Italy. A Preliminary Note.**—*Jl. Trop. Med. & Hyg.* 1925. Dec. 1. Vol. 28. No. 23. pp. 413–419. With 14 text figs.

The authors describe the finding of larvae in certain species of dung beetles, but they have not been able to detect them in household insects such as blatta, blattella, blaps, tenebrio, and ephestia. It was found possible to infect *Blattella germanica* with eggs of the gongylonema of cattle, but experiments with *Blatta orientalis* failed.

The authors succeeded in infecting two rats with gongylonema of ruminants by feeding them with larvae from the intermediate hosts.

HADWEN (S.). **Ascariasis in Horses.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 1–9. With 1 plate.

Three colts, two new-born, and one four to five months old, already naturally infested with Ascarides, were dosed with embryonated eggs of *Ascaris equorum*. In the younger animals coughing was observed after an interval of from 9 to 16 days. The older animal was coughing slightly about three weeks after the eggs had been administered. Larvae were found in the bronchi. In the older foal an eosinophilia was stimulated by a second dose of eggs given 31 days after the first.

In one of the new-born foals no eosinophiles could be found in the blood 71 days after it had been fed with the eggs, but they reappeared on the 145th day.

Examination of sections showed that eosinophiles collect in the connective tissues of the lungs and liver, this indicating that the larvae migrate through these tissues.

The writer puts forward the view that there is a condition of immunity produced by repeated invasions of ascarides, and that apart from the antibodies found the eosinophiles secrete a substance which is definitely detrimental to the worms themselves.

CAMERON (T. W. M.). **Some Recent Advances in Veterinary Helminthology.**—*Ann. Rept. National Vet. Med. Assoc. Great Britain & Ireland.* 1925. pp. 161–183.

This paper is an " attempt to place before the practitioner such of the more recent discoveries in worm parasites of the domesticated animals, their prevention and cure, as the writer considers to be of most outstanding interest to the veterinary surgeon."

SCHWARTZ (B.) & CRAM (Eloise B.). **Horse Parasites collected in the Philippine Islands.**—*Philippine Jl. Sci.* 1925. Aug. Vol. 27. No. 4. pp. 495–505. With 3 plates.

This paper, as the title indicates, is a record of the occurrence of certain parasites in the horse in the Philippine Islands. Twenty-three parasites are recorded for the first time in the Islands. No new species are described.

SCHWARTZ (B.). **Helminth Parasites of Hogs in the Philippine Islands.**—*Philippine Jl. Sci.* 1925. June. Vol. 27. No. 2. pp. 227–233. With 2 plates.

This report contains a list of the parasites collected from pigs slaughtered at the Azcarraga Abattoir in Manila.

No new species are described.

HALL (Maurice C.) & CRAM (Eloise B.). **Carbon Trichloride as an Anthelmintic, and the Relation of its Solubility to Anthelmintic Efficacy.**—*Jl. Agric. Res.* 1925. May 15. Vol. 30. No. 10. pp. 949–953.

Experiments in which coarse crystals or fine powder of carbon trichloride were given in capsules showed that the substance has no value as an anthelmintic.

SAHEKI (Y.). **An Experimental Study on the Development of the Dwarf Tapeworm** (*Hymenolepis nana*).—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 305–308.

The larvae penetrate the villi in the upper part of the small intestine and in four days become cysticerci. Five days after ingestion the well-developed larvae emerge and leave the villi. At seven days the young tapeworms have some segments at the end of the body. Two days later reproductive organs appear. Fourteen days after ingestion the segments are full of eggs, and three days later ripe segments may be found in the faeces of experimental animals. The dwarf tapeworm therefore appears to require no intermediate host.

BEDFORD (G. A. H.). **The Sheep Nasal Fly. S. Africa.**—*Jl. Dept. Agric. S. Africa.* 1925. Aug. Vol. 11. No. 2. pp. 119–123. With 3 text figs.

This short paper is a popular account of the life-history, symptoms, treatment and prevention. In connection with the latter it is stated that the most practical method is to provide the sheep with salt troughs smeared with tar. A V-shaped trough is best. If a trough with parallel sides is used, it should, after the sheep have become used to it, have placed over it boards with holes large enough to admit the noses of the animals. Tar should be smeared round the holes. Such precautions should be taken from the beginning of September to May. Infected sheep should be kept on hard ground, as this will prevent the animals from dropping larvae on to the veldt and infecting it. The larvae which fall can be collected and destroyed daily.

SMIT (Bernard). **Sheep Blow-Fly Control: A New Method.**—*Jl. Dept. Agric. S. Africa.* 1925. Nov. Vol. 11. No. 5. pp. 455–458. With 1 fig.

The three flies so far found to attack sheep in South Africa are *Lucilia sericata*; *Chrysomyia albiceps*, and *Chrysomyia chloropyga*. It would appear that dead meat is the natural food for the maggots, the habit of blowing the wool of live sheep having been acquired. The disposal of carcases is, therefore, of the utmost importance.

Experiments showed that from a single carcase left out thousands of flies might emerge. A few such carcases therefore would produce sufficient flies to cause enormous losses.

The means adopted for the disposal of carcases in various parts of the world are dealt with briefly. Burning is impracticable on account of the cost of fuel of any kind in the Karroo. Burying is also impracticable on account of the labour involved. Burying is ineffective unless it is deeper than 3 feet, and even then the ground must be rammed hard.

Poisoning carcases is open to obvious objections, and also was not found to be very effective.

The new trap method described is constructed on lines similar to the Baber Housefly maggot trap. Two 6-foot sheets of corrugated iron are bolted together along one edge, and then bent into the form of a trough with open ends. The top edges are bent inwards to form an incurved lip, thus preventing the maggots from crawling over the sides. The trough is then suspended by wire between fencing posts a foot or so from the ground, and a paraffin tin is placed under each of the ends. These tins are opened so as to leave a projecting rim about half-an-inch wide all round the top inside, and they are kept in place by banking them round with a little earth.

The carcases are simply thrown into the trough, the flies are attracted in enormous numbers, and very soon the carcase is a mass of maggots. These reduce the carcase to practically nothing but skin and bone. The maggots crawl away from the remains and fall into the tins, where they are killed by pouring paraffin and water over them. From four carcases two tins nearly full of maggots were collected. After these had been killed they were thrown out on the veldt, where they dried up.

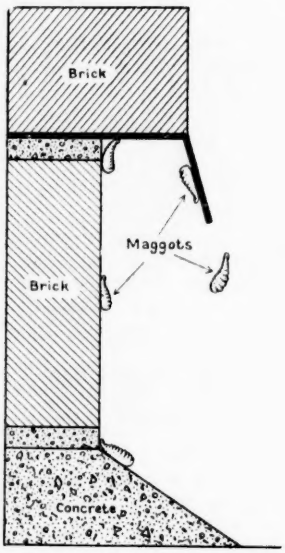
The suggestion is put forward that it may be possible to preserve the maggots for poultry food.

BABER (E.). **Fly Control by Means of the Fly-Larval-Trap Manure Enclosure.**—*Jl. Roy. Army Med. Corps.* 1925. Dec. Vol. 45. No. 6. pp. 443–452.

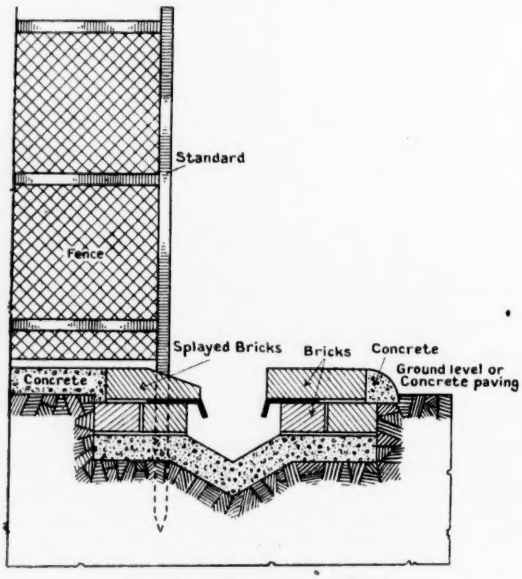
An essential part of the device described in this paper is an overhanging lip round which maggots cannot pass; temperature, however, also plays an important part in fly control. Larvae prefer a temperature of about 90° F. At 115° F. they die and at lower temperatures (108° F.) if the material in which they are placed is wet.

Records made at Pretoria showed that a manure heap measuring 4 by 4 by 4 feet reached and maintained a temperature of 120° to 130° F. for 7 weeks. It then gradually cooled and was at 80° F. at the end of 14 weeks. This heap was wetted with 4 gallons of water daily. A similar heap kept dry registered 20 degrees lower.

[Illustrating Captain E. BABER's paper on a Fly-Larval-Trap.]



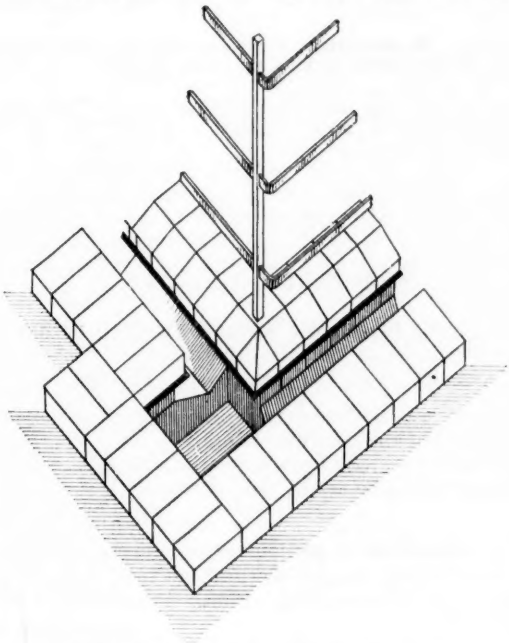
Maggot falling back into the Trench.



Trench and Fence complete.

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

[Illustrating Captain E. BABER's paper on a Fly-Larval-Trap.]



Isometric View showing Sump of Corner.

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

The device is constructed as follows: A central concrete floor with a bricked or concrete trench running round it; the inner and outer edges of the trench have an overhanging metal rim which prevents the emergence of the larvae from the trench. At the corner there is a collecting sump also provided with the metal overhanging lip.

The liquid from the manure collects in the sump and should be returned to the heap, which stands on the central concrete floor surrounded by a frame and wire mesh fence to permit of packing.

The figures give a clear idea of the construction of the trap.

CAWSTON (F. G.). **The Dangerous Snail. Need for Control of Fluke-Infested Pests.**—*The Farmers' Weekly* (South Africa). 1925. Oct. 7. Vol. 30. No. 761. p. 414.

KOTLÁN (Alexander). **On** *Davainea proglottina* **(Dav.) and its Synonyms.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 26–32. With 1 plate.

NEVEU-LEMAIRE (M.). **Le mâle de** *Pteridopharynx omoensis* **Neveu-Lemaire parasite du Rhinocéros africain** (*Rhinoceros bicornis*). [The Male of *Pteridopharynx omoensis* Neveu-Lemaire of the African Rhinoceros.]—*Ann. Parasit. Humaine et Comparée.* 1925. Oct. Vol. 3. No. 4. pp. 392–393. With 1 plate.

PATTON (W. S.). **Diptera of Medical and Veterinary Importance. I. Types of Older Authors in Continental Museums.**—*Philippine Jl. Sci.* 1925. June. Vol. 27. No. 2. pp. 177–200.

SCHWARTZ (B.). *Ascaridia lineata*, **a Parasite of Chickens in the United States.**—*Jl. Agric. Res.* 1925. Apr. 15. Vol. 30. No. 8. pp. 763–772. With 18 text figs.

WEIDMAN (F. D.). **Hepaticoliasis. A Frequent and sometimes Fatal Verminous Infestation of the Livers of Rats and other Rodents.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 19–25. With 2 plates.

WOODLAND (W. N. F.). **On** *Proteocephalus marenzelleri*, *P. naiae*, **and** *P. viperis*. —*Ann. Trop. Med. & Parasit.* 1925. Sept. 20. Vol. 19. No. 3. pp. 265–279. With 14 text figs.

BACTERIAL DISEASES.

CURASSON (G.). **La tuberculose bovine à l'abattoir de Bamako.** [Bovine Tuberculosis at Bamako Abattoir.]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 687–689.

The author records the occurrence of 7 cases of tuberculosis among 1,107 zebus killed at the slaughter house.

The organism appeared, from its pathogenic powers and from its cultural characters, to be of the bovine type.

BASSET (J.). **Réceptivité du péritoine et du sang pour** *Bacillus anthracis*. [The Receptivity of the Peritoneum and the Blood for *B. anthracis*.]—*C. R. Soc. Biol.* 1925. July 17. Vol. 93. No. 25. pp. 413–414.

The writer states that it is an error to say that if care be taken to prevent contamination of the skin hundreds of lethal doses can be introduced into the peritoneum without causing animals any harm. The intraperitoneal injections were made by removing a small flap of skin from the flank, cauterising the exposed surface, injecting into the peritoneum and recauterising. A dose of $\frac{1}{120}$ cc. of the culture used was fatal to guineapigs in 2–3 days by subcutaneous injection. Of this culture $\frac{1}{10}$ cc. was fatal in from 3–7 days when injected intraperitoneally.

If a less pathogenic material be used (pure spores) and the tissues traversed by the needle are contaminated the results indicate that the peritoneum is less susceptible to infection than the subcutaneous tissue, but the power of resistance is not so great as that assigned to it by BESREDKA.

If guineapigs are injected intraperitonally through the skin and killed at 30 hours the peritoneum appears to be normal. The peritoneum is then sprinkled with broth and the broth is used for the inoculation of culture media; only a few colonies grow. On the other hand, the omentum is contracted and congested. Microscopic examination reveals an enormous increase in the polynuclear leucocytes and a few bacteria undergoing dissolution which either are gram negative or stain irregularly.

Rabbits which succumb to $\frac{1}{10}$ cc. inoculated subcutaneously in 3–4 days, survive when the same dose is injected intravenously into the ear vein. 0·25 cc. proves fatal in 50 per cent. of animals, and 1 cc. is invariably fatal. The blood is therefore less receptive than the subcutaneous tissue.

SINGER (E.). **Milzbrandstudien.** [Anthrax.]—*Zeitschr. f. Immunitäts.* 1925. Oct. 31. Vol. 45. No. 1. pp. 12–26.

The author finds that aggressin which is most plentiful in the oedema which follows subcutaneous inoculation, while being harmless for healthy animals, is capable of modifying the course of an existent or subsequent inoculation. The bacilli, even after intravenous inoculation, are removed from the circulation by the histocyte cells. In these the bacilli multiply and paralyse their action. They then escape into the blood stream and produce the anthrax septicaemia.

When aggressin is injected this course of the infection is modified in that septicaemia occurs earlier. The injection may lead to complete paralysis of the histocytes and thus cause extracellular multiplication or it may partially paralyse them and thus lead to their earlier liberation from them.

The injection of aggressin 24 hours before intravenous inoculation with virulent culture did not prevent the bacilli from disappearing from the blood stream at first, but septicaemia occurred in 18 hours, whereas in controls it occurred in 30–48 hours.

Aggressin does not stimulate the bacilli to rapid multiplication.

That the septicaemia is delayed by the action of the histocyte cells is shown by the fact that the internal organs can be proved to be infected prior to the invasion of the blood.

This, perhaps, explains BESREDKA'S view that the skin is more susceptible than the internal organs, and of WOLLMANN'S finding that they are equally susceptible after aggressin injection.

Experiments with a haemolytic streptococcus indicated that the aggressin is specific.

VELU & VAYSSE. **Au sujet de la durée de l'immunité conferée aux animaux vaccinés contre le charbon bactéridien par la methode intradermique en un temps.** [The Duration of the Immunity Conferred by the Single Dose Intradermic Vaccination against Anthrax.]—*Rec. Méd. Vét.* 1925. June 30. Vol. 101. No. 12. pp. 259–260.

The authors give an account of outbreaks of anthrax in two herds of pigs in Morocco. In one, comprising 800 animals, 60 deaths occurred in a week, and in the other, of 150 animals, there were 11 deaths. The whole of both herds, including pigs only a few days old, were vaccinated intradermally without preliminary use of serum. The outbreaks stopped instantaneously.

About 8 months later 8 fatal cases of anthrax occurred in the first herd and two in the second. Investigation showed that all these cases had occurred in animals 5 to 6 months old, that is to say, in animals born after the general vaccination of the herds.

[It is regrettable that no unvaccinated controls were left in the herd.]

MULLER (Léon). **Quelques recherches sur le mécanisme de l'infection charbonneuse.** [Research regarding the Mechanism of Infection with Anthrax.]—*C. R. Soc. Biol.* 1925. Nov. 20. Vol. 93. No. 33. pp. 1243–1247.

Investigating a new method of vaccination against anthrax in 1914 the author carried out the following experiments. A pigeon's

egg was emptied and the shell sterilized. It was then half filled with a suspension of anthrax bacilli, the orifice was sealed with Canada balsam, and the shell was introduced into the peritoneal cavity of a rabbit. The rabbit died of anthrax five weeks later. Repeating the experiment with the substitution of flasks of broth for the peritoneal cavity the author found that after a minimal period of 12 days the bacilli passed through the shell close to the orifice made when its contents were evacuated. No doubt there were imperceptible holes in this area, and the permeability of the shell had been increased by the dislocation of the membrane in the interior of the shell.

It was difficult to explain the facts according to the theory expressed by BESREDKA. Further experiments were therefore planned.

Chamberland filters containing an emulsion of anthrax bacilli were placed in broth. The time required for the penetration of the filter was variable even with filters of the same density, but it ranged from about one to three weeks, depending largely on the texture of the filter used. Short lengths of filters were cut off with a saw and these had culture placed in them. The open end was closed with a cork which was sealed with Canada balsam.

By modifying the technique it is possible to liberate bacilli into the peritoneum after any desired interval [presumably short of that required for the natural penetration] by attaching a piece of capillary glass tube to the short length of filter and wrapping this round with cloth of some kind to prevent injury to organs by fragments of glass when the tube is broken.

Brief details are given of a number of experiments, but it is not stated which technique was used in each.

A further publication is promised.

SACHELARIE (V.). **Etude comparative sur l'immunité conférée par la vaccination anticharbonneuse pratiquée par inoculation dans la peau et par la vaccination pastorienne classique chez les bovins.** [A Comparison of Intradermal and Subcutaneous Inoculation of Cattle against Anthrax.]—*Arch. Veterinara.* 1924. Vol. 18. No. 5-6. pp. 116–125.

This paper has appeared elsewhere, and has already been abstracted in this *Bulletin* (Vol. 13, No. 3, Aug. 31, 1925, pp. 94–96).

NEWODOFF (A. P.) in collaboration with WEINTROB, PINOUS, WLADIMIRSKI, ANFILOFF & FROLOFF. **De la cutivaccination et de la cuti-immunité dans le charbon.** [Cuti-Vaccination and Cuti-Immunity in Anthrax.]—*Ann. Inst. Pasteur.* 1925. Nov. Vol. 39. No. 11. pp. 888–896.

The author gives details of experiments in which horses vaccinated intracutaneously withstood doses of virus administered subcutaneously. In one instance the animal received only one dose of vaccine and the test inoculation was given after an interval of eight months. Similar results were obtained when animals (horses and cows) vaccinated by the intracutaneous path were fed with culture.

As the result of these experiments, four horses vaccinated intracutaneously, and two unvaccinated, were inoculated subcutaneously with virulent anthrax cultures, the vaccinated animals receiving four and fifty times the doses given to the controls. The controls

died, but the vaccinated animals showed only an oedema at the seat of inoculation, and a rise of temperature ranging from 0·5 to 1·5° C.

Following these satisfactory results the method was put into general practice, and 2,450 bovines and 213 horses were vaccinated without complication of any kind. Several cases of anthrax occurred among the non-vaccinated animals.

With a view to testing whether animals can be infected with anthrax by paths other than the skin, an 18-months-old colt was inoculated intravenously with a large dose of culture. To avoid contamination of the skin a canula of wide bore was first passed into the vein, and then a long thin needle attached to the syringe was passed through this. Both the needle and canula were washed through with salt solution after the inoculation. The colt failed to become infected.

BUZNA (D.). **Die Unterscheidung des Vollvirulenten Milzbrandbazillus von den mitigierten (Vaccine-) Varietäten auf verschiedenen Kohlehydrat-Nährböden.** [The Differentiation of Virulent and Vaccine Strains of Anthrax Bacilli by Carbohydrate Fermentations.]—*Zeitschr. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1925. Nov. 16. Vol. 28. No. 4. pp. 267–276.

The author gives tabular statements of the results obtained.

EDWARDS (J. T.). **The Prevention of Strangles.**—*Jl. Comp. Path. & Therap.* 1925. Dec. Vol. 38. Pt. 4. pp. 256–266.

This paper contains an account of attempts that have been made to check the ravages of strangles in India by means of vaccine and serum. Strangles is the cause of a loss estimated at 5 per cent. among young country-bred horses on admission to Army remount depots.

Bacteriological examinations have shown that streptococci are almost invariably present in pure culture in samples of pus, but these organisms do not appear to be all of one type. For this reason some fifty different strains have been used in the preparation of serum and vaccine. No details are given regarding the technique of production of either the vaccine or serum.

Tests were also carried out with an " extracted vaccine " prepared on the lines of DREYER'S tuberculosis vaccine, and with an " aggressin."

The figures given show on the whole that the various methods appeared to reduce mortality somewhat.

SEDDON (H. R.). **The Cause of Botulism in Animals in Australia.**—*Jl. Australian Vet. Assoc.* 1925. Sept. Vol. 1. No. 3. pp. 59–62.

Cases of botulism have been recorded in horses following the ingestion of chaff, hay, and pasture grass, and in cattle after chaff, hay and bones or other carrion. Of the foodstuffs only chaff has been proved toxic experimentally. Toxin producing organisms have been recovered from the bones of cattle, sheep, and from grain. The train of symptoms is, however, so characteristic that it would appear that in all cases the symptoms are produced by organisms of the botulinus group. The only strain so far isolated in pure culture in Australia is that described by the author as *B. parabotulinus.* A number of impure strains have been recorded by other authors, and

two of these appeared to be identical with SEDDON's strain. An organism possibly identical has been isolated in the United States and termed *B. botulinus* type C.

An organism agreeing with the American type B has been isolated. This was recovered from maize ensilage, the feeding of which led to the death of three cows and three horses presenting suspicious symptoms. The silage was to some extent mouldy, and some of the mouldy portions had been fed to the animals which died. Anaerobic cultures were obtained and these proved fatal to guineapigs with typical symptoms on the second or third day.

Further supplies of silage were obtained and cultures again made. These proved toxic for guineapigs, but large animals fed on the silage developed no symptoms.

A guineapig injected with antitoxins of types A and B survived, while those done with antitoxins of parabotulinus and type C (Graham) and a control died.

Attempts to isolate the toxin producing organism in pure culture failed. Further tests with filtered cultures (impure) and antitoxins indicated that the organism present was of type B.

MITCHELL (C. A.). *Hemophilus ovis* **(Nov. Spec.) as a Cause of a Specific Disease in Sheep.**—*Jl. Amer. Vet. Med. Assoc.* 1925. Oct. Vol. 68. No. 1. (From a reprint.)

The author describes a disease of sheep which has been encountered in the Ottawa Valley, and which was at first thought to be haemorrhagic septicaemia. The disease is sudden in onset. Difficulty of respiration accompanied by a grunting sound, cyanosis of the skin, and great depression are the most marked symptoms. In the later stages there is a distressing cough. The faeces contain blood, the urine shows a variable amount of albumen and renal cells and blood corpuscles are found in the sediment. Tonic spasm of the neck-muscles have been observed.

From the bronchial mucus the author isolated a small gram-negative bacillus which he names *Haemophilus ovis*, and which he holds to be the cause of the condition.

On blood agar pin-head viscous colonies develop in 36 hours. These later become dry and dull-looking. A small amount of growth is obtained in plain agar only after repeated subculture on blood agar. From plain agar subcultures could be obtained in broth in which turbidity and ropy strands were formed.

Acid was produced with a large number of sugars, but there was no gas production. The organism was pathogenic for guineapigs and rabbits, but though it caused illness in sheep it was not invariably fatal.

Experiments indicated that natural infection was via the respiratory tract. No evidence of toxin formation was obtained.

STUART (G.). **The Occurrence of Contagious Abortion of Cattle in Palestine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. pp. 131–137.

The authors record the occurrence of contagious abortion in cattle in Palestine, and find that about 30 per cent. of the animals are infected.

Reference is made to the establishment of the fact that undulant fever has recently made its appearance in Palestine. Of seven cases detected in 1924, all but one were traced to goat's milk. The other case occurred in a boy who had never taken goat's milk, and had never been in contact with goats.

BEVAN (Ll. E. W.). **The Abortoscope. A Simple Apparatus for the Detection of Infectious Abortion of Cattle.**— *Vet. Jl.* 1925. Oct. Vol. 81. No. 10. pp. 476–479.

The apparatus, which the author terms the Abortoscope, was demonstrated at a meeting of veterinarians and medical men held at Salisbury in November, 1921. By its means it is claimed that tests for abortion can be carried out in the field with a considerable degree of accuracy.

A small test tube contains a suspension of the abortion bacillus in a special diluent, the composition of which is not stated. The mouth of the tube is closed by a cork projecting from which into the tube is a coil of wire. This coil is so made that by capillary attraction it will hold such an amount of blood that when this is mixed with the suspension of bacilli the dilution is 1 in 100. The liquid used for suspending the bacilli is " so carefully adjusted that the whole blood can be used, thus obviating the separation of the serum."

In use the tube is shaken vigorously until the word " infected " printed on a label attached to the tube can no longer be read through the emulsion. Blood is obtained from an animal by either snipping the edge of the ear or puncturing a vein with a needle. The cork is removed and the liquid contained in the coil is shaken or blown out. A drop of blood about the size of a match head is collected in the loop. The cork is replaced and the tube shaken vigorously. Tubes thus prepared are placed in a vertical position in a warm place for 18 hours. If at the end of that time the contents of the tube have settled to the bottom, leaving the contents water-clear, and the word " infected " on the label clearly visible, the animal may be regarded as infected. If there is any degree of opacity the result should be considered as doubtful or negative, and a further test made.

The tubes remain fit for use for six months after issue.

MCALPINE (J. G.) & RETTGER (L. F.). **Serological Studies on Bovine Infectious Abortion.**— *Jl. Immunol.* 1925. Sept. Vol. 10. No. 5. pp. 811–828. With 10 text figs.

The purpose of this paper is to point out certain relations between serum and milk titres obtained by complement fixation and agglutination tests, and to show the dependence of the serological reactions of new-born calves upon the colostrum ingested.

Samples were obtained from a herd comprising Jerseys, Guernseys, Holsteins and Ayrshires. The average percentage of infected animals ranged from 20–30 per cent. The blood of all animals was tested quarterly, and all infected animals were tested monthly. Milk from reactors was also tested monthly. Samples of blood were taken from calves whenever possible before they sucked, and afterwards at intervals until they became negative, when they were tested quarterly. Serological tests were carried out with colostrum before the calves had sucked in some instances.

It was found possible to classify the animals tested into three groups. Group 1 contains cows which possess a high blood titre to both agglutination and complement fixation, and whose milk shows both types of antibody throughout lactation. In Group 2 are animals whose blood titres are lower than in Group 1, and whose milk contains reacting bodies only during colostral and drying-off periods. Group 3 comprises cows whose serum titres are low and whose milk shows agglutinins, but not complement fixing bodies.

Complete results have been obtained from 14 cows. 28·57 per cent. (4 animals) fell into Group 1, 50 per cent. (7 animals) in Group 2, and 21·34 per cent. (3 animals) in Group 3. It would appear that most animals with positive sera have antibodies in their milk only during the colostral and drying-off periods.

Tests have been made with blood from 34 calves taken before they were allowed to suck. Of these, 19 were from reacting cows and 15 from non-reactors. All were negative to both tests. All the calves from non-reactors remained negative, and the colostrum from these animals always gave negative results.

The calves of reactors became reactors themselves soon after they were allowed to suck. Antibodies could be detected in the blood within 2 hours, and the reactions increased during the first 24 hours, but the titres never equalled those of the colostrum.

One of the 19 calves died at three days. This calf was negative before sucking, and its serum remained negative 24 hours after it had taken colostrum. The calf died of a digestive disturbance.

Calves fed upon high titre colostrum remain reactors longer than those fed upon low titre colostrum. It is an almost invariable rule that the power of reaction is lost by calves within 6 months. One case is mentioned by the authors in which complement fixation tests were positive up to 10½ months, although agglutinins had disappeared by the 5th month.

Three calves were kept from colostrum for 24 hours and were fed upon milk containing antibodies. The sera of these calves gave no reaction. This confirms ORCUTT and HOWE's result that agglutinins appear in the blood only after colostrum is fed.

SEELEMANN (M.). **Zur bakteriologischen Diagnose der Gasödeme bei Rind und Schaf.** [The Bacteriological Diagnosis of Gas Oedema in Cattle and Sheep.]—*Arch. Wissen. u. Prakt. Tierheilk.* 1925. Aug. 1. Vol. 52. No. 6. pp. 525–532.

The author described tests carried out with material from 100 cases (44 from cattle and 56 from sheep).

Most of the muscular tissue received for investigation was dry, but in cases where it was not it was dried at 37° C.

Fragments weighing about a gramme were soaked in 96 per cent. alcohol for 10 to 20 minutes, and were then ground up in a mortar with 2–3 cc. of broth. About five loopfuls of this were spread on a grape-sugar-blood-agar plate and by means of a Drigalski spatula a series of 2 to 4 dilution plates were made. The plates were incubated in a Zeiszler anaerobic apparatus for 36–48 hours at 37° C. The blood used was sheep-blood and the sugar was present in 2 per cent. concentration.

The author does not agree with ZEISZLER that sheep-blood is not satisfactory for culture purposes. He also found that 1 per cent. sugar yielded better growths than 2 per cent. The colonies obtained on solid media were irregularly rounded in shape with either a central prominence or a depression. Such growth could be obtained on the surface of blood agar dried from diseased muscle, but better in sub-cultures from liver broth cultures.

The author is under the impression, but cannot definitely state it as a fact, that sheep blood is not so suitable for the cultivation of the blackquarter bacillus from bovine cases.

Parablack-quarter bacilli (Type III) and Fraenkels gas bacillus both grew on the medium as described by ZEISZLER, the former as a veil and the latter as a reseda-green growth.

DE JENEY (A.). **Rôle de la peau dans le hog-choléra du cobaye. Infection et immunisation locale.** [The Skin in Hog-Cholera in the Guineapig. Infection and Immunization.]—*C. R. Soc. Biol.* 1925. Oct. 23. Vol. 93. No. 29. pp. 921–923.

These experiments appear to have been carried out with the so-called bacillus of hog-cholera, and not with the filterable virus. The results indicated that the skin was about ten times as susceptible as the peritoneum.

JORDAN (E. O.). **The Differentiation of the Paratyphoid Enteritidis Group. IX. Strains from Mammalian Hosts.**—*Jl. Infect. Dis.* 1925. March. Vol. 36. No. 3. pp. 309–329.

MYCOTIC DISEASES.

MÉLANIDI (C.) & STYLIANOPOULO (M.). **Conjonctivite cryptococcique expérimentale chez le chien.** [Experimental Cryptococcic Conjunctivitis in the Dog.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1081–1083.

The authors inoculated a dog subconjunctivally with pus from an unruptured farcy bud. The pus contained large numbers of cryptococci but no bacteria of any kind. About a week later a small swelling appeared, and this continued to increase in size, and the conjunctiva covering it became markedly congested. There was somewhat marked lachrymation.

A fortnight after inoculation there was ulceration of the conjunctiva and pus containing cryptococci was obtained. There was enlargement of the parotid lymph gland. Pus was taken and used after dilution for the inoculation of a second dog. The course of the disease could not be followed in the first because it died as the result of an accident.

The infection developed far more slowly in the second animal. It was not until a month or more after inoculation that ulceration occurred. In this case the ulceration involved the skin. There was no enlargement of the lymphatic gland. Cryptococci were present in large numbers. Spontaneous recovery took place in about 10 days.

Further information is promised regarding experiments with rabbits and other animals.

DISEASES DUE TO FILTERABLE VIRUSES.

STUART (G.) & KRIKORIAN (K. S.). **Anti-Rabic Procedure in Palestine with Special Reference to Decentralization of Treatment.**—*Ann. Trop. Med. & Parasit.* 1925. Dec. 16. Vol. 19. No. 4. pp. 391–418.

Cauterisation of the wound with, preferably, fuming nitric acid is of value only if applied within half an hour of the bite. The vaccine used is a 2 per cent. suspension of the brain of a rabbit killed with fixed virus in 1 per cent. phenol in distilled water. Before issue the vaccine is diluted with an equal amount of normal saline solution. Distilled water is preferred to normal saline for making the first emulsion as a better suspension is obtained. This vaccine is incubated at 37° C. for 24 hours before dilution with salt solution, and it is tested for anaerobic and aerobic organisms. The dose in all circumstances is 5 cc. daily (2·5 cc. "intracutaneously" on each side of the abdomen). Fourteen injections on successive days are given.

No cases of post-treatment paralysis have been encountered.

If preserved in the dark and on ice the vaccine retains its immunizing power for three months; the method lends itself therefore to the distribution of the vaccine to different centres for use.

The paper concludes with appendices showing the form of register of cases undergoing treatment and the regulations for the control of rabies.

LÜHRS (E.). **Winke für die histologische Tollwutdiagnose.** [Points in the Histological Diagnosis of Rabies.]—*Zeitsch. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1925. Nov. 16. Vol. 28. No. 4. pp. 300–303.

After pointing out what he considers to be the defects of the methods of histological diagnosis (referring only to the detection of Negri bodies) in use, the author describes the technique of the method which he has devised.

Clean slides are covered with a thin film of 20 per cent. gelatin in water, and a second batch are coated with glycerin-albumen. Thin transverse slices of Ammon's horn are placed upon the albuminised slides. A drop of paraffin oil is then spread over the surface of the gelatin on the prepared slides and these are inverted over the slice of tissue. The slides are kept in contact under pressure by pinch cocks for a quarter to half-an-hour at room temperature. The clips are then removed and the slides, adhering to each other, are placed in a slanting position in the paraffin oven. The gelatin melts and the slides are taken apart. An impression of the tissue is left on the albuminised slide, and this is ready for fixation and staining. This is generally done by methyl alcohol and Lenz method.

LEBAILLY (C.). **La réapparition des foyers de fièvre aphteuse et la conservation du virus dans la nature.** [The Reappearance of Centres of Foot and Mouth Disease and the Preservation of the Virus in Nature.]—*C. R. Acad. Sci.* 1925. Sept. 21. Vol. 181. No. 12. pp. 383–384.

The author thinks that caution should be exercised in the acceptance of the view that outbreaks of foot-and-mouth disease may be due to virus liberated from the hoofs when these are pared.

In a number of cases infected animals have been removed from farms and sent back after recovery. This has in no case led to fresh outbreaks.

TRAUTWEIN (K.). **Zur Frage der Einschluszkörperchen bei Maul und Klauenseuche.** [Inclusion Bodies in Foot-and-Mouth Disease.] —*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1925. Aug. Vol. 52. No. 6. pp. 475–482.

The author confirms GINS' observations regarding the occurrence of inclusion bodies in specimens from foot-and-mouth disease lesions, but he states that, whereas GINS showed that these could be detected from 2–4 days after infection in guineapigs, he has been able to find them in still larger numbers up to 18 days after infection.

Foot-and-mouth disease lesions, and particularly those of the tongue, heal very readily. In examining sections it was found that nuclear inclusions were present in large numbers in the cells around the leucocyte invasions which are caused by the lesions of the disease.

Control specimens were taken from lesions on the tongues of guineapigs which were caused by heat or by acids. In these, exactly the same cell inclusions were found as in the foot-and-mouth disease lesions. They could also be found in sections of tongues of normal guineapigs. The possibility, therefore, of their being of a specific nature is excluded.

Further, it can be shown that the cell inclusions are to be found readily in cells in the stomach, duodenum, spleen, and pancreas in both healthy guineapigs and in guineapigs infected with foot-and-mouth disease.

The author believes that they are fragments of chromatin derived from leucocytes.

WALDEMANN. **Richtlinien zur Schutzimpfung gegen Maul-und Klauenseuche.** [Protective Inoculation against Foot-and-Mouth Disease.]—*Berlin. Tierärzt. Wochenschr.* 1925. Oct. 30. Vol. 41. No. 44. pp. 713–715.

Serum is now being produced in large amount in Germany. The laboratories on the Island of Reims are turning out 1,000 litres a week. It must be remembered that the serum is capable of producing passive immunity for a period of about ten days only. It must, therefore, be used only in circumstances in which this period of immunity is valuable, such as at fairs and markets, or on journeys.

ARKWRIGHT (J. A.) & BURBURY (M.). **Observations on Foot-and-Mouth Disease. Section I.—Transmission of Foot-and-Mouth Disease to Rodents.**

BEDSON (S. P.) & MAITLAND (H. B.). **Section II.—The Attempted Cultivation of the Virus and its Reaction to Various Agents, Chemical and Physical.**—*Jl. Comp. Path. & Therap.* 1925. Dec. 31. Vol. 38. Pt. 4. pp. 229–255.

As stated in a footnote, this paper is published by permission of the Foot-and-Mouth Disease Research Committee of the Ministry of

Agriculture and Fisheries, and contains a fuller account of the observations made than the First Progress Report of the Committee.

It has already been established that guineapigs can be infected with the virus of foot-and mouth disease, with the development of primary lesions within 24 hours at the seat of inoculation (when this is by scarification of the skin of the sole), and a secondary crop of vesicles and general systemic infection some twenty-four hours later. The blood is infective at the time of maximum development of the primary vesicles, but this disappears almost as soon as the secondary vesicles appear. The infection establishes immunity. It is advisable to select guineapigs of 300 grammes weight or more. The fluid from the vesicles 24 to 48 hours after inoculation contains a very active virus. The epithelium covering vesicles is virulent, and may be stored for weeks in 50 per cent. glycerol. The disease does not spread naturally among guineapigs.

The work done by Arkwright and Burbury confirms and extends these findings.

They find intracutaneous inoculation into the integument of the sole of the hind foot preferable to scarification as the means of infecting. Not only are better lesions produced by smaller doses, but the lesions are uniform and are more constant. One virus failed to cause infection when 1 cc. of 1 in 200,000 dilution was injected intracardially, while a dilution of 1 in 1,000,000 of the same virus set up the disease by intracutaneous inoculation. After intracutaneous inoculation primary vesicles appear in 18–24 hours, but rarely as late as the 4th day. The variation depends upon the size and condition of the animal, and the the size and infectivity of the dose of virus. Symptoms of generalization appear one or two days after the primary vesiculation. There is salivation and vesiculation of the mouth. About 12 hours later vesicles appear on the fore feet. By the 4th or 5th day salivation has ceased and healing has begun. Desquamation of the foot lesions begins about the 10th day, and is complete in about 3 weeks. At the onset of generalization the temperature generally rises about 2° F., but this is said not to be a reliable indication of infection. During the illness there is loss of appetite and condition accompanied by diarrhoea. A guineapig may lose one-third of its weight in a week. The mortality is about 5 per cent.

When inoculation is practised on other (hairy) parts of the body primary vesiculation is not observed.

The blood appears to be most infective about the time of local reaction and thereafter decreases. At the maximum ·05 cc. of blood diluted 1 in 1600 has been found infective by intracutaneous inoculation.

"After a typical attack of the disease, even when this has not been at all severe, guineapigs, whenever tested, have proved to be immune to the virus with which they were originally inoculated, with one possible exception in the case of an animal first inoculated with 'No. 1' and subsequently with 'G.F.'" ('No. 1' and 'G.F.' were the two viruses used.—Ed.). The tests have usually been made three weeks to a month after the attack. Animals which have been unsuccessfully inoculated with weak or deteriorated virus have almost invariably proved susceptible when again inoculated with active virus."

Natural immunity, if it occurs, must be rare.

It has not been found possible to infect by ingestion.

In no case has any evidence that recovered guineapigs might act as carriers been obtained.

In attempts to infect rats and mice the following results have been obtained. Intramuscular inoculation of wild rats had caused the development of vesicles in the mouth, and the virus has been present in the blood for 24 to 48 hours. White rats appear to be less susceptible than wild ones. House mice have failed to develop lesions after inoculation, but the virus has persisted in the blood for a short time. In some wood mice lesions developed in the mouth, but in only about 50 per cent. of those inoculated.

SECTION II.

The virus used was collected from foot vesicles at their maximum tension, and prior to filtration diluted to 1 in 50. Mandler candles were found to be the best for the purpose of filtration. All samples of vesicular fluid used for cultural and other experiments were titrated by guineapig inoculation. Although some fluids showed a titration as high as 1 in 5,000,000 the majority were in the neighbourhood of 1 in 500,000.

In cultural work the first method attempted was that described by FROSCH and DAHMEN, but the results were entirely negative.

Various other methods and modifications were tried, but without success in any one instance. From experiments designed to test the vitality of the virus *in vitro* the following facts were ascertained. The virus persists longer the colder it is kept. In certain media, e.g., saline, acid phosphate solutions, and glycerol, infectivity was lost so rapidly at 37° C. (less than 24 hours) that survival experiments could only be carried out at lower temperatures. Experiments to test the best pH for the survival of the virus showed that it was between 7·5 and 7·6 no matter at what temperature the material was stored. Both potassium phosphate and potassium acetate appeared to exert a favourable influence upon the survival of virus. Reduction of atmospheric pressure to 50 or 30 mm. of mercury did not appear to have any influence upon it.

Glycerol in a 50 per cent. concentration will preserve the virus for some months if fragments of epithelium from vesicles are placed in it and kept in cold store. This is remarkable as the pH of glycerol is usually about 5·5. It was further found that the presence of glycerol enables the virus to survive in an acid medium which by itself was destructive to it. Filtered virus preserved with glycerin does not survive so long, but owing to the difficulty of ascertaining how much virus is present in the epithelium it is impossible to say whether the tissue elements themselves play any part in the preservation.

Filtered virus (1 in 500) in M/50 phosphate (KH_2PO_4 and K_2HPO_4) at pH 7·6 without glycerol is still infective after 96 days in cold store. Among the chemical agents tested with a view to determine their action upon the virus were: Phenol, alcohol, acetone, chloroform, formalin, and sodium citrate. The last was included in view of the frequency with which it is used in the collection of blood. The virus was found to possess considerable resistance against the first three of these, but 0·1 per cent. formalin destroyed it within 48 hours. Sodium citrate in a concentration of 0·5 per cent. at 37° C. was found to be definitely harmful to the virus as judged by survival tests.

No evidence was obtained that the virus was capable of adhering strongly to washed red corpuscles. Precipitation of vesicle fluid caused no reduction in the amount of virus remaining in the fluid and, finally, centrifuging diluted vesicle fluid (1 in 50) for 2 hours at 5,500 failed to cause any concentration of virus.

NICOLAU (S.) & GALLOWAY (I. A.). **Activité pathogène du virus de la fièvre aphteuse pour le lapin.** [The Pathogenicity of the Virus of Foot-and-Mouth Disease for the Rabbit.]—*C. R. Soc. Biol.* 1925. Nov. 27. Vol. 93. No. 34. pp. 1283–1284.

Using a virus which had been passed through guineapigs, the authors have produced lesions on the tongues of rabbits by intralingual inoculation. The lesions were vesicular and made their appearance in 24 to 48 hours. The vesicles ruptured and left an erosion which was sometimes covered with a delicate false membrane.

To prove that these were true foot-and-mouth lesions emulsions were prepared from them, generally on the third or fourth day, and these, after filtration through a Chamberland L3 filter, were used for inoculation into guineapigs. Success was obtained in every case. They also succeeded in transmitting the infection from rabbit to rabbit by means of filtrate through 13 passages.

Histological examination of the lesions showed that an intense polynuclear invasion was a pronounced feature, and surrounding the lesion there was marked infiltration of large mononuclears. The affected epithelium had undergone complete necrosis and had been replaced by a fibrinous exudate containing a large number of leucocytes and blood corpuscles. The lesion, in fact, tended to become a pustule. No evidence of generalization of the virus was obtained.

DI DOMIZI (Giovanni). **Il Sangue ossalato iperimmune nella profilassi contro la peste bovina.** [Hyperimmune Oxalated Blood in the Prevention of Cattle Plague.]—*La Clin. Vet.* 1925. Aug. Vol. 48. No. 8. pp. 516–524.

The author recommends the use of hyperimmune oxalated blood on the grounds that the technique of preparation is far more simple than that of hyperimmune serum and the number of doses obtained from the amount of blood drawn is greater. It is on both grounds more economical.

CURASSON (G.). **Les séquelles de la peste bovine et les porteurs de germes.** [The Sequels to Cattle Plague and Virus-Carriers.]—*Rev. Gén. Méd. Vét.* 1925. Oct. 15. Vol. 34. No. 406. pp. 519–554.

In animals which have recovered from cattle plague the following symptoms are sometimes observed: Persistent poorness of condition, dull coat, frequent cough, intermittent febrile attacks, chronic enteritis, in females chronic vaginitis and sterility. At places where skin lesions developed in the course of the infection tufts of hair stand erect. The serum of such animals does not give the formol-gel reaction save when the temperature is up.

At the post-mortem examination of such animals healed ulcers are found in the abomasum, patches of inflammatory congestion may be found in various parts of the intestine and the mesenteric glands are enlarged and moist. With regard to virus carriers the author states that the already known facts are as follows: The milk of a cow which recovered two months previously was infective, and in two cases vaginal discharge from recovered cows (interval since recovery not stated.—Ed.) was infective.

In further support of his view regarding the existence of carriers the author gives the following facts: The faeces of a heifer which had recovered from cattle plague 7 weeks previously, after dilution and filtration through a Kitasato filter, proved infective for a calf by inoculation. At the post-mortem of the heifer three days after the faeces were taken a patch of congestion was found in the duodenum. An emulsion of this lesion was not infective.

A virus producer, 34 days after apparent recovery, showed a rise of temperature. It was slaughtered. Healed lesions were found in the abomasum and some small patches of congestion in the duodenum. One of these was mashed up in a mortar, filtered through a Martin filter and used for the inoculation of a calf. Cattle plague developed on the sixth day.

A virus producer which had recovered from inoculation about a month previously showed a rise of temperature. Blood drawn from its jugular was used for the intravenous and subcutaneous inoculation of a calf. Classical lesions developed on the fifth day.

The possibility of accidental infection is ruled out by the author. The author believes that carriers are a source of infection through the medium of their excreta. It is admitted that such carriers are rarely met with.

RABAGLIATI (D. S.). **The Potency of Anti-Cattle Plague Serum.**—*Jl. Comp. Path. & Therap.* 1925. Sept. Vol. 38. Pt. 3. pp. 204–213.

This article is based upon tests carried out on lines indicated by EDWARDS in his Report of the Imperial Bacteriological Laboratory, Muktesar. The accounts of research work published in this report have not been abstracted because further full publication is promised.

According to EDWARDS the classic method of hyperimmunization of cattle for anti-serum production is no longer necessary. It is held that after the first reaction due to simultaneous inoculation no injection of virulent blood, however large the dose, is capable of increasing the anti-body content of the blood. If a sufficiently large dose of serum be used all trace of reaction to virulent blood given at the same time can be prevented. "With the blocked-out or nearly blocked-out reaction a potent anti-serum is obtained only for about four weeks after the injection of the virus, whereas after a mild but decided reaction a potent serum is obtained about a week after the commencement of apyrexia and then for a period of about eight weeks, and perhaps longer, without further treatment of the animals."

Rabagliati describes the method employed at the Serum Institute, Cairo. Susceptible Egyptian cattle are given simultaneously 2 cc. of virulent blood and 100 cc. of serum. This produces little or no reaction. A fortnight later they receive 4 litres of virulent blood, and after a further fortnight are bled for serum. They immediately receive 4 more litres of blood and are bled twice at fortnightly intervals. The third hyperimmunizing dose is followed by three bleedings and the fourth by four. This process is then continued, bleeding every fortnight and hyperimmunizing every two months. The hyperimmunizing injections are given intramuscularly.

In Rabagliati's first test 6 Cyprus bulls were given virulent blood and serum prepared in the manner indicated by EDWARDS from 6 animals. A representative sample of the whole was used and doses

ranging from 15 to 30 cc. per 200 lb. body weight were employed. Three of the animals died, one was killed when moribund, and two, after a severe attack, recovered. Four controls were used. Two of these, on the score of economy, were bled for virus on the 6th day. One died of rinderpest, and one made only a partial recovery and had to be destroyed. The protective doses used were those employed for the standard serum issued by the Cairo Institute.

The serum used in the above tests was obtained by bleeding the animals 21, 28, and 35 days after simultaneous inoculation. It was thought desirable to carry out a test using serum taken 14 days after the simultaneous inoculation.

Four Cyprus bulls were used in this test, and doses of 20 and 30 cc. per 200 lb. body weight were given. All four developed clinical cattle plague. Three died and one made only a partial recovery and had to be slaughtered. Two controls were bled to death for virus on the 6th day.

Parallel with the first experimental test 6 Cyprus bulls were treated in the routine manner for potency tests with the standard serum issued by the Institute. All showed a temperature reaction, but nothing more.

Rabagliati concludes that the method would not be suitable for Egypt. Even if the serums could be used in doses sufficiently large the method could not be applied owing to the almost constant complication of piroplasmosis. Rabagliati has found, as SHILSTON found in India*, that the immunity following simultaneous inoculation when the dose of serum has been sufficiently large to prevent reaction absolutely is permanent.

Rabagliati finds in Egypt that the potency of serum does not decline even though an animal be in use as a serum producer for periods up to 5 years.

EDWARDS states that after a "certain limited period" the hyperimmunizing doses given are actually without effect.

In a further experiment Rabagliati shows that 6 bulls immunized with serum prepared from the blood of cattle which had been in use for 4 years and had had their immunity reinforced 24 times all recovered. A similar number given the same doses of serum from animals which had had a single hyperimmunizing dose only after simultaneous inoculation, all developed severe reactions and 3 of them died.

In 1919 tests showed that serum from animals that had been in use for a longer time was more potent than that from animals recently immunized.

Further experiments in 1923 indicated that the potency of the serum was influenced by the amount of blood given for hyperimmunizing purposes.

Rabagliati's conclusions are as follows :—

1. That the potency of anti-cattle-plague serum made from blood drawn within 5 weeks of the simultaneous inoculation cannot always be relied on.

2. That before the classic method of hyperimmunization be given up, careful tests of the new method should be made in the country concerned.

3. That under the old hyperimmunization method serum cattle can produce a potent serum for at least four years, and probably much longer periods.

* SHILSTON's death prevented publication of his results (Ed.).

HORNBY (H. E.) & HALL (G. N.). **Studies in Rinderpest Immunity: I. Susceptibility and Resistance.**— *Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 529–536. With 2 charts.

In a note at the beginning of this article the authors state that they are recording what they have found to occur, and the conclusions they have drawn irrespective of whether they are in agreement with commonly accepted theories or not. This paper is to be one of a series, and all references to literature will be found in the final one of the set.

The cattle used in the experiments were all obtained from the Iringa district, were there has been no rinderpest for 5 years, and more than 90 per cent. of the young animals were found to be susceptible.

The strain has been maintained by weekly subcutaneous inoculations for 3 years, but every few months some irregularity has broken the sequence of inoculations and then it has been carried on by contact or by intravenous inoculation. The results have been constant throughout. A 5 cc. dose given to a batch of cattle has usually resulted in death in 30 per cent., severe reactions with recovery in 30 per cent. and temperature reactions only in the remainder. It is held by the authors that these differences are due to differences of *resistance* after the body has been invaded and not due to differences of *susceptibility*.

The definitions of susceptibility and resistance given by the authors are as follows: Susceptibility is a condition which allows the rinderpest virus to get sufficient foothold in the tissues of its host to cause symptoms of disease. Resistance is the rapidity and efficiency with which the defensive forces of the body are mobilised against the invading virus, after this has already obtained a foothold by reason of the body's susceptibility.

There is no such thing as partial susceptibility of cattle to rinderpest, for if an animal is not susceptible it is immune and no exposure to infection will set up the disease. Were the differences observed in the courses taken by the disease due to differences of susceptibility the minimal infective dose would vary from animal to animal. If, however, susceptibility is constant, and independent of the course subsequently run by the disease, the minimal infective dose will be constant.

To test this point experiments have been carried out by means of dilutions of infective materials, blood, peritoneal washings, etc. Preliminary tests showed that the most useful results were obtained when 20 cc. of dilution contained 0·2, 0·02, and 0·002 cc. of the original infective material.

Details are given of 10 tests in which this plan was followed. In 8 of these the results supported the writers' theory. One experiment was spoiled owing to the fact that the animal receiving the weakest dilution proved to be immune, and the other because a sufficiently weak dilution was not employed. Various infective materials were employed, e.g., blood on the 3rd day of reaction, liver extract on the same day, peritoneal washings, blood on the 1st day of reaction, and on the 4th day of reaction.

The writers feel justified in continuing the series of experiments in the hope of obtaining data from which to construct a curve showing the rise and fall of virus content in the blood and afterwards in the

other tissues as the disease advances. From these it may be possible to obtain information regarding the best method of obtaining antigen for hyperimmunization purposes. The authors do not wish to convey the impression that they think susceptibility is invariable, they believe it to be constant to the extent that any complex biological phenomenon can be constant, i.e., sufficiently constant to permit of definite conclusions being drawn regarding the minimal infective doses. Two anomalous cases have been met with in a series of experiments similar to those detailed in the present papers. In these animals receiving smaller doses reacted while those receiving larger doses failed to do so, although they were proved by subsequent inoculation to be susceptible.

A possible explanation of such cases may be that in weak dilutions, that is in dilutions containing only a small amount of virus, the distribution of the virus may not be absolutely uniform. That this may be actually so is shown by an experiment in which a group of oxen received the same minimal infective dose. The period of incubation was prolonged in two and the third failed to become infected, although susceptible.

ONO (S.). **Further Notes on Contagious Pleuro-Pneumonia in Imported Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Sept. Vol. 4. No. 3. pp. 257–258. [Author's English abstract.]

The author's experiments have been carried out with virus obtained in the course of an outbreak at Osaka in May, 1925. This, like the previous outbreak in September, 1924, appears to have originated among cattle imported from China.

He has obtained cultures (stab) in beef-broth-agar or Martin's agar containing 9 per cent. bovine serum. In shake cultures growth took place in a disk 0·5 centimetres below the surface of the medium. Good growths were obtained in about a week under anaerobic conditions, and in a medium prepared from the aqueous humour of bovine eyes an opalescent culture was obtained within about the same period.

Intraocular inoculation of rabbits produced iritis, and the virus survived in the eye for two weeks. Intratesticular inoculation produced swelling which lasted from a fortnight to three weeks, but there was no suppuration.

Serum from inoculated rabbits gave a precipitin reaction with serum from infected cattle.

NAGAO (M.). **Beitrag zur Pathogenese der Erythrozytenverminderung bei der infektiösen Anämie des Pferdes.** [Pathogenesis of the Reduction of the Red Blood Corpuscles in Equine Pernicious Anaemia.]—*Jl. Jap. Soc. Vet. Sci.* 1925. June. Vol. 4. No. 2. pp. 151–154.

The author believes that the anaemia is of the haemolytic type and is brought about by destruction of the red cells in the spleen, bone marrow, and to a less extent in the lymphatic glands.

During febrile attacks there is actually an increase in the number of red cells. This is caused by stimulation of the bone marrow by the virus.

HARALAMBOPOULO & PAPACHRISTOPHILOU. **Variole des chèvres.** [Variola of Goats.]—*Rec. Méd. Vet.* 1925. Sept. 15. Vol. 101. No. 16. pp. 528–529.

Benign and severe forms of the disease are described.

In the benign form four stages are recognizable.

The first stage is characterized by fever, dullness, loss of appetite, acceleration of respiration, and congestion of the mucous membranes. This lasts about four days.

In the second or eruptive stage patches of congestion appear on the thin skin in the neighbourhood of the tail. The skin becomes thickened and a pustule forms. The pustules may remain descrete or may become confluent. They may spread to all parts of the body. This phase lasts about five days.

The pustule becomes converted into a " vesico-pustule " containing reddish or yellow liquid. Within four or five days these vesicles burst and brownish crusts are formed. The crusts then fall and scars are left. Healing is delayed as a result of scratching.

In the severe form of the disease the onset is marked by very high fever and general exacerbation of the other symptoms. The lesions are extensive and diffuse. Suppuration occurs and this is accompanied by a blood-stained discharge from the nose, and diarrhoea. In these cases death usually occurs.

At the post-mortem examination broncho-pneumonia and enteritis are found. In the lungs the variolous pustules form nodules as large as peas, they are of a greyish tint and are surrounded by zones of broncho-pneumonia. Variolization yielded favourable results. The sheep is not susceptible even to inoculation.

NIKOLAJEWA (E.). **Antiwutimpfung mittels Karbolvakzine nach der Methode von Prof. Fermi.** [Anti-Rabies Inoculation with Fermi's Carbol-Vaccine.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1925. Aug. Vol. 95. No. 7/8. pp.423–428.

ZIEGLER (M.). **Zur Histologie der ansteckenden Blutarmut.** [The Histology of Infectious Anaemia.]—*Berlin. Tierärzt. Wochenschr.* 1925. Nov. 13. Vol. 41. No. 46. pp. 751–752.

MISCELLANEOUS.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. I. Observation of a Rickettsia, *Rickettsia ruminantium* (n.sp.) in the Tissues of Infected Animals.**—*Jl. Exp. Med.* 1925. Aug. 1. Vol. 42. No. 2. pp. 231–252. With 2 plates.

The investigations detailed were carried out at the suggestion of THEILER.

In a tabular statement are given the passages through which the virus was maintained, the virus was carried from animal to animal by intravenous inoculation.

A further tabular statement shows the material used for inoculation, date of the first rise of temperature, date of maximum rise, date of destruction of the animal, post-mortem findings, and the distribution of the organisms.

As controls normal animals and animals suffering from other diseases were examined. In no case were Rickettsia found in the blood by microscopic examination. They were, however, most readily detected in the endothelial cells of the capillaries of the renal glomeruli, and in the superficial grey matter of the cerebral cortex. They were also found in the spleen, lymph glands, corpus luteum, cerebellar cortex, suprarenals, midbrain, medulla, ovaries, corpus striatum, salivary glands, pancreas, and heart muscle. They were never found in the liver or lungs. Testicles were seldom available for examination. The detection of the organisms became difficult when the period elapsing between death and examination exceeded 6 hours.

The most favourable time for finding them was two to four days after the maximum temperature had been reached. As a rule they could not be found 6 days after the temperature had fallen to normal, and this was in general agreement with the loss of infectivity of the blood.

The most characteristic lesion is swelling of the endothelial cells. The organisms were never found in such cells as individuals, but in dense masses ranging from a small number up to several hundred. The swelling of the cells was sometimes so marked as to occlude the lumen of the vessels. In other cases the cells became detached into the stream. The invaded cells appeared to show no other abnormality, nor was there any leucocytic infiltration.

The organisms after fixation in Zenker and staining were found to be coccus-like and to measure from 0·2 to 0·5μ. Occasionally diplococcus-like forms were seen, and this was the only suggestion of multiplicative forms observed.

All fixatives ordinarily used for bacteria were found to be suitable. Stained by Giemsa they acquired a clear deep blue colour, but they also stained with simple basic dyes. They were gram negative. When stained with iron-haematoxylin they lost their colour before the nuclear chromatin.

Details are given of the reasons for excluding the Rickettsia as normal cellular inclusions or products of degeneration or phagocytosis. A tabular statement shows comparisons between the Rickettsiae of Rocky Mountain spotted fever, typhus and heartwater as seen in the mammalian tissues.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. II.** *Rickettsia ruminantium* **(n. sp.) in the Tissues of Ticks transmitting the Disease.**—*Jl. Exp. Med.* 1925. Aug. Vol. 42. No. 2. pp. 253–274. With 2 plates.

In these experiments larvae from a single female were used. These were divided into batches some of which were fed upon normal animals and some upon animals suffering from heartwater. Since the infection does not pass through the egg the larvae were clean and these together with nymphs and adults derived from them were available for examination. The sick animals upon which they were fed were proved to be infective by inoculation.

It was not found possible to obtain very satisfactory specimens by embedding in paraffin, and many of the examinations were carr ed out with smears and teased specimens.

All ticks, infective and non-infective, showed a large gram-positive pleomorphic bacterium-like organism in the epithelium of the Malpighian tubules. This will be described with others in a subsequent paper.

It was found impracticable to examine the organism in fresh teased specimens on account of the difficulty of identifying it. Granules from the salivary glands presented a very similar appearance. Medicinal methylene blue in a concentration of 1 in 20,000 stained the organisms more intensely than the granules. Brilliant cresyl blue and neutral red could also be used but with less success. Dark ground illumination was also of little use on account of the presence of enormous numbers of mitochondria. With air-dried, Giemsa stained preparations care was necessary to distinguish the two structures, but the salivary granules were usually brick red and Rickettsia blue or light purple. When individuals could be seen it was found that two minute granules of a red tint were embedded in a blue stained material. No filamentous forms were found.

The clump-like formation of the Rickettsia was very permanent. In older nymphs clumps were found in the lumen of the intestine, but there were also scattered individuals. In clumps the bodies appeared coccus-like, but in sections where masses had been cut barely tangentially the effect of superposition was avoided and they were seen to be bacillary in shape. The staining reactions in sections depended upon the fixative. With Giemsa after Zenker they were blue, bluish-purple after Regaud's fluid, formalin or Carnoy's liquid, pale green after Flemming and light pink after Mayer's picro-sulphuric mixture. They were gram negative, but stained well with Goodpasture's fuchsin and Unna's alkaline methylene blue. Their outlines, by any method, were less distinct than those of bacteria.

Larvae which were fed upon animals suffering from heartwater acquired Rickettsiae which appeared to be identical with those found in the tissues of the affected animals upon which they were fed. Larvae of the same brood fed upon healthy animals did not acquire the parasite.

Larvae which had engorged themselves upon infected animals could not be tested for infectivity directly because they would not feed, but the nymphs developed from them were proved to be infective.

The organism was found in the heartwater tick *Amblyomma hebraeum* only. More than a score of other species were examined, but with negative results.

MARSHALL (A.) & MACDONALD (N.). **Hints on Tropical Technique.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 371–375. [Abstracted from the *Laboratory Journal*, Dec. 1924.]

This paper contains valuable hints to workers in the tropics.

It is recommended that glass-ware be cleaned by placing it for an hour in the following solution: Caustic potash, 100 gm., water, 100 cc., and methylated spirit, 800 cc. Cover glasses should always be stored in 60 per cent. alcohol. Bleeding needles and canulae should be stored in alcohol and each should be passed into a piece of glass tubing

having a slightly greater length so that the point is not injured. Rubber tubing should be stored in glycerin or in an atmosphere of carbon dioxide. The tube is coiled in jars having corks sealed with paraffin wax. The tube is passed through an aperture of the required size in the cork. Carbon dioxide is passed into the jar through the tube and the lumen of the tube is then closed with a piece of glass rod. As tubing is required a length is cut off and the glass rod replaced in the cut end.

In certain circumstances it has been found useful to close flasks of culture media with surgical oiled silk instead of cotton wool plugs. The silk is secured over the opening of the tube or flask with a few turns of thread below the lip. Sterilizing is effected at 15 lb. for 20 minutes. On cooling the silk is pulled taut by the contraction of the air within the flask. The silk is then coated with molten paraffin. To inoculate the flask, melt the paraffin, pierce the silk with a syringe needle, and inject the seed material from the syringe. Re-seal the hole by melting the paraffin. Paraffined paper is recommended for the sealing of stock cultures as rubber caps perish too readily.

If rubber caps have to be used they should be coated with low melting point paraffin. Blood films should be packed for despatch by post with pieces of cardboard between the slides to prevent rubbing. The slides should then be rolled in paper. The package, after it has been sealed up, should be dropped into melted paraffin until it is permeated. This prevents the growth of fungi, and the smears will keep indefinitely.

THEILER (A.). **Das Knochenfressen der Rinder in Südafrika.** [Osteophagia of Cattle in South Africa.]—*Schweiz. Arch. f. Tierheilk.* 1925. Sept. 15. Vol. 67. No. 17. pp. 405–414.

Formerly osteophagia was thought to be closely allied to, if not identical with, "licking disease" (Lecksucht) as seen in Europe. It is now, however, realized that the two are distinct.

Osteophagia may occur in stabled animals or in animals on the veldt. In the early stages more or less fresh bones are eaten, but as the disease progresses even putrid bones are attractive to the affected animals. The depravity of appetite, however, is not limited to the eating of bones. Bone-eaters as a rule show no digestive disturbances, nor are nervous symptoms seen. In some cases, but not in all, there is some degree of wasting.

The evidence suggests that osteophagia is due to a lack of phosphorus. This was obtained in experiments in which several hundred cattle were used. The disease was more in evidence during the winter when the veldt is dry, and it declined in the spring with the appearance of the new vegetation. Analysis showed that the phosphorus content of the grass was lowest when the percentage of affected animals was highest. The P_2O_5 content of the grass ranged from 0·08 per cent. minimum to 0·6 per cent. maximum of the weight of the dry plant. The addition of 2 per cent. P_2O_5 to the diet caused the disappearance of the disease within six weeks. 120 gm. of sterile bone meal per day stamped it out within a month, and 400 gm. per day in less than a fortnight. Calcium phosphate, sodium phosphate and pure phosphoric acid in the drinking water achieved the same result.

Dressing the land with superphosphate likewise caused the disappearance of the disease, but animals again showed symptoms when they were transferred to land not so dressed.

Osteophagia is, therefore, not a disease, but merely a symptom; the disease itself is termed Aphosphorosis.

Experiments showed that different animals required different amounts of phosphorus, in the form of bone meal, to maintain what was termed "osteophagia-equilibrium." Full grown oxen required the least, and milch cows in milk the most. Half a pound weekly was sufficient for a full grown ox. Growing animals over 300 lb. weight required 1 lb., and 2 to 4 lbs. were required for cows in milk. Sucking calves do not require bone meal.

That calcium was not deficient was shown in further experiments which were carried out on a farm which was deficient both in phosphorus and calcium. The addition of prepared chalk to the diet had no effect. The animals so treated showed, in fact, more marked symptoms than controls. Further investigations showed that the condition of aphosphorosis may exist without osteophagia being observed. The addition of phosphorus to the diet was followed by a marked increase in weight. That is to say, that there are all grades of aphosphorosis. The slight cases may show only an absence of proper growth and increase in weight. In other cases the body may show disproportionate growth in different parts. Symptoms are most noticeable in cows with their second or third calf. Great stiffness of gait is also seen. Recovery frequently takes place when the calf is weaned. The calves of such animals generally remain normal while sucking, but when weaned their bones become fragile, and the metacarpal and metatarsal bones show marked thickening of the epiphyses.

The disease should not be confused with rickets, osteomalacia, and "licking disease."

COWDRY (E. V.). **Studies on the Etiology of Jagziekte. I. The Primary Lesions.**—*Jl. Exp. Med.* 1925. Sept. 1. Vol. 42. No. 3. pp. 323–333. With 3 plates.

Jagziekte is a chronic catarrhal pneumonia of the sheep, which is peculiar to South Africa. It is thought to be contagious and causes severe losses.

The extensive overgrowth of the pulmonary epithelium which is characteristic of the disease appears to be secondary to changes in the interalveolar tissues.

What appears to be the primary lesion is a thickening of the interalveolar tissue. These thickenings take place in scattered foci. There appears to be no definite relationship between them and the pleura or the bronchi. They are due to collections of macrophages which are accompanied by lymphocytes. None of the cells show signs of mitotic division, and they do not appear to be produced by local multiplication of any kind. Coincident with this change there is a variable amount of dilatation of the alveolar capillaries. The macrophages then migrate into the alveoli. Very few polynuclear cells are present.

Foreign material was found in the peribronchial lymphatics and less frequently in the macrophages in the thickened interalveolar septa. It was also found in the mediastinal gland. It took the form of biconvex lens-shaped bodies from 3–15 μ in diameter and 1–5 μ in thickness. No definite crystalline facets were seen. The bodies were translucent and faintly yellow in colour. Chemical tests showed that

having a slightly greater length so that the point is not injured. Rubber tubing should be stored in glycerin or in an atmosphere of carbon dioxide. The tube is coiled in jars having corks sealed with paraffin wax. The tube is passed through an aperture of the required size in the cork. Carbon dioxide is passed into the jar through the tube and the lumen of the tube is then closed with a piece of glass rod. As tubing is required a length is cut off and the glass rod replaced in the cut end.

In certain circumstances it has been found useful to close flasks of culture media with surgical oiled silk instead of cotton wool plugs. The silk is secured over the opening of the tube or flask with a few turns of thread below the lip. Sterilizing is effected at 15 lb. for 20 minutes. On cooling the silk is pulled taut by the contraction of the air within the flask. The silk is then coated with molten paraffin. To inoculate the flask, melt the paraffin, pierce the silk with a syringe needle, and inject the seed material from the syringe. Re-seal the hole by melting the paraffin. Paraffined paper is recommended for the sealing of stock cultures as rubber caps perish too readily.

If rubber caps have to be used they should be coated with low melting point paraffin. Blood films should be packed for despatch by post with pieces of cardboard between the slides to prevent rubbing. The slides should then be rolled in paper. The package, after it has been sealed up, should be dropped into melted paraffin until it is permeated. This prevents the growth of fungi, and the smears will keep indefinitely.

THEILER (A.). **Das Knochenfressen der Rinder in Südafrika.** [Osteophagia of Cattle in South Africa.]—*Schweiz. Arch. f. Tierheilk.* 1925. Sept. 15. Vol. 67. No. 17. pp. 405–414.

Formerly osteophagia was thought to be closely allied to, if not identical with, " licking disease " (Lecksucht) as seen in Europe. It is now, however, realized that the two are distinct.

Osteophagia may occur in stabled animals or in animals on the veldt. In the early stages more or less fresh bones are eaten, but as the disease progresses even putrid bones are attractive to the affected animals. The depravity of appetite, however, is not limited to the eating of bones. Bone-eaters as a rule show no digestive disturbances, nor are nervous symptoms seen. In some cases, but not in all, there is some degree of wasting.

The evidence suggests that osteophagia is due to a lack of phosphorus. This was obtained in experiments in which several hundred cattle were used. The disease was more in evidence during the winter when the veldt is dry, and it declined in the spring with the appearance of the new vegetation. Analysis showed that the phosphorus content of the grass was lowest when the percentage of affected animals was highest. The P_2O_5 content of the grass ranged from 0·08 per cent. minimum to 0·6 per cent. maximum of the weight of the dry plant. The addition of 2 per cent. P_2O_5 to the diet caused the disappearance of the disease within six weeks. 120 gm. of sterile bone meal per day stamped it out within a month, and 400 gm. per day in less than a fortnight. Calcium phosphate, sodium phosphate and pure phosphoric acid in the drinking water achieved the same result.

Dressing the land with superphosphate likewise caused the disappearance of the disease, but animals again showed symptoms when they were transferred to land not so dressed.

Osteophagia is, therefore, not a disease, but merely a symptom; the disease itself is termed Aphosphorosis.

Experiments showed that different animals required different amounts of phosphorus, in the form of bone meal, to maintain what was termed "osteophagia-equilibrium." Full grown oxen required the least, and milch cows in milk the most. Half a pound weekly was sufficient for a full grown ox. Growing animals over 300 lb. weight required 1 lb., and 2 to 4 lbs. were required for cows in milk. Sucking calves do not require bone meal.

That calcium was not deficient was shown in further experiments which were carried out on a farm which was deficient both in phosphorus and calcium. The addition of prepared chalk to the diet had no effect. The animals so treated showed, in fact, more marked symptoms than controls. Further investigations showed that the condition of aphosphorosis may exist without osteophagia being observed. The addition of phosphorus to the diet was followed by a marked increase in weight. That is to say, that there are all grades of aphosphorosis. The slight cases may show only an absence of proper growth and increase in weight. In other cases the body may show disproportionate growth in different parts. Symptoms are most noticeable in cows with their second or third calf. Great stiffness of gait is also seen. Recovery frequently takes place when the calf is weaned. The calves of such animals generally remain normal while sucking, but when weaned their bones become fragile, and the metacarpal and metatarsal bones show marked thickening of the epiphyses.

The disease should not be confused with rickets, osteomalacia, and "licking disease."

COWDRY (E. V.). **Studies on the Etiology of Jagziekte. I. The Primary Lesions.**—*Jl. Exp. Med.* 1925. Sept. 1. Vol. 42. No. 3. pp. 323–333. With 3 plates.

Jagziekte is a chronic catarrhal pneumonia of the sheep, which is peculiar to South Africa. It is thought to be contagious and causes severe losses.

The extensive overgrowth of the pulmonary epithelium which is characteristic of the disease appears to be secondary to changes in the interalveolar tissues.

What appears to be the primary lesion is a thickening of the interalveolar tissue. These thickenings take place in scattered foci. There appears to be no definite relationship between them and the pleura or the bronchi. They are due to collections of macrophages which are accompanied by lymphocytes. None of the cells show signs of mitotic division, and they do not appear to be produced by local multiplication of any kind. Coincident with this change there is a variable amount of dilatation of the alveolar capillaries. The macrophages then migrate into the alveoli. Very few polynuclear cells are present.

Foreign material was found in the peribronchial lymphatics and less frequently in the macrophages in the thickened interalveolar septa. It was also found in the mediastinal gland. It took the form of biconvex lens-shaped bodies from 3–15μ in diameter and 1–5μ in thickness. No definite crystalline facets were seen. The bodies were translucent and faintly yellow in colour. Chemical tests showed that

they were not composed of cholestrol, or some other material likely to be produced locally. The fact that they were contained in macrophages indicated an exogenous origin.

Irregular vegetable fragments were also observed.

A gram-negative bacillus and a gram-positive diplococcus were identified microscopically in some of the cases.

COWDRY (E. V.). **Studies on the Etiology of Jagziekte. II. Origin of the Epithelial Proliferations, and the Subsequent Changes.**—*Jl. Exp. Med.* 1925. Sept. 1. Vol. 42. No. 3. pp. 335–345. With 3 plates.

As a result of epithelial proliferation portions of the lungs affected assume an adenoma-like appearance, the scattered proliferations becoming confluent. In certain cases growth takes place in the form of packed masses of cells. Fibrosis occurs in the centre and the animals die of broncho-pneumonia.

In the early stages the proliferating cells may assume a papilloma-like form, or they may be spread over the alveolar wall. The epithelial proliferation is accompanied by a multiplication of fibroblasts. And in rare cases foci of myxomatous tissue develop in the connective tissue.

Although there is marked proliferation of the epithelium mitotic figures are rarely seen. Metastases are not observed in any part of the body.

The areas involved may reach several inches in diameter and on examination may bear some resemblance to adenomata. Extensive lymphocytic infiltrations do not always occur.

It is to be noted that in any affected lung, lesions at different stages may be encountered.

No worm parasites could be found to account for the lesions, nor could any bacteria be detected microscopically which could be causally connected with the lesions.

JEANTET (P.). **L'examen sur fond noir au microscope des préparations fixées et colorées.** [The Examination by Dark Ground Illumination of Fixed and Stained Specimens.]—*C. R. Soc. Biol.* 1925. Oct. 23. Vol. 93. No. 29. pp. 895–896.

The method of using the apparatus is the same as for moist preparations.

The author states that organisms are more readily detected than in moist preparations and than in films examined in the ordinary way. He also states that it is very valuable for photomicrography.

BEVAN (Ll. E. W.). **Carcinoma of the Conjunctiva of Hereford Cows.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. pp. 153–155.

The author records 8 cases of growths involving the eyes of Hereford cattle in Rhodesia. Six were imported animals, from different herds in Great Britain, one was bred in the Union of South Africa, and one —a bull—was bred in Rhodesia. Sections from one of the cases were submitted to McFadyean, who gave a definite diagnosis of carcinoma. No cases were observed among any of the animals on the ranch other than the Herefords.

CHANDLER (A. C.) & CHOPRA (R. N.). **The Toxicity of Carbon Tetrachloride to Cats. A Warning.**—*Indian Med. Gaz.* 1925. Sept. Vol. 60. No. 9. pp. 406–407.

The authors, using carbon tetrachloride which is used for human beings, and which is free from carbon bisulphide and phosgene, found that the doses mentioned by HALL and SHILLINGER were very toxic.

Of 49 cats given 0·5 cc. per kilo 4 survived, of 27 given 0·25 cc. per kilo. 3 survived, and of 12 given 4 cc. per kilo, all died. In the latter experiment vomiting almost always occurred within half an hour. The liver in every case showed central necrosis, and extensive fatty degeneration. In the kidneys there was fatty degeneration and necrosis and infiltration of Bowman's capsule with blood.

Albumen was present in all the samples of urine tested.

BUBBERMAN (C.). **Rapport omtrent een reis naar Australië ter bestudeering van veeartsenijkundige toestanden.** [Report of a Tour of Australia to Study Veterinary Conditions.]—176 pp. With 15 plates. 1925. Weltevreden: Landsdrukkerij.

HOWE (Paul E.) & SANDERSON (Everett S.). **Variations in the Concentration of the Globulin and Albumin Fractions of the Blood Plasma of Young Calves and a Cow following the Injection of *Bacillus abortus*. Variations in the Concentration of the Protein Fractions of the Blood Plasma of Pregnant and Non-pregnant Cows, or of Cows which have Aborted.**—*Jl. Biol. Chem.* 1925. Jan. Vol. 62. No. 3. pp. 767–788.

RABAGLIATI (D. S.). **Veterinary Legislation in Egypt.**—*Vet. Jl.* 1925. Oct. Vol. 81. No. 10. pp. 479–484.

REPORTS.

JAARBOEK VAN HET DEPARTEMENT VAN LANDBOUW, NIJVERHEID EN HANDEL IN NEDERLANDSCH-INDIE. 1924. [**Year-book of the Dept. of Agriculture, Industry and Commerce in the Dutch East Indies.**]

The Annual Report of the Veterinary Research Laboratory is given in Chapter XII (pp. 197–220).

During the year, great increases were noted in the amount of work of various kinds which the laboratory had to undertake; this increased activity affected especially the section dealing with sera and vaccines. Corresponding increases in building accommodation, apparatus and experimental animals had also to be made.

Of 410 specimens sent in for diagnosis, 214 were negative; the positives included: 28 cases of anthrax; 22 of rabies; 42 of septicaemia haemorrhagica; 19 of blackquarter, and 20 of surra, with only two each of babesiosis and anaplasmosis respectively. It is of interest to note that all the cases of septicaemia haemorrhagica, and 27 out of the 28 cases of anthrax, occurred in buffaloes; 5 of the cases of blackquarter also occurred in this species.

The complement-fixation test for glanders was applied to 1,493 sera; 484 positives were recorded, and 243 gave doubtful results. There was obvious need for some additional test, and the complement-haemagglutination reaction was first tried, but it was given up, as it was found that the various bovine sera tested had too low a content

of normal haemolysin for guineapig corpuscles. The conglutination reaction (technique of PFEILER-WEBER) appeared from a few tests to give very good results, and will be applied systematically in 1925.

The complement-fixation reaction was applied to the sera of 12 tuberculous cattle; 5 were positive, one was doubtful, and 6 were negative; several sera from healthy cattle all gave negatives.

Only 7 sera were sent in to be tested for contagious abortion (bovine), although the disease occurs widely in the Dutch East Indies.

A large amount of mallein was prepared; it was tested on infected and healthy horses, but it was felt that some further means of testing is needed. An enquiry into the possibility of adapting to the control of mallein the guineapig test used for tuberculin was instituted; the results are not yet complete, but it appears (as has been found by others) that the method is not successful with mallein.

With epizootic lymphangitis, the work done in 1924 confirmed previous experience that vaccino-therapy has no advantage over the usual methods of treatment.

One subject of investigation was "Thick-knee Disease," which occurs in trek animals in Sumatra. Cattle of both sexes are affected, and it appears as an acute affection of various joints—ulnar, tarsal, carpal, etc.—with severe lameness; in many cases cows abort, and castration of males seems to favour its development. This investigation is incomplete.

A bovine disease known as "Cascado" was suspected to have a phyto-parasitic cause, but skin material received at the laboratory showed the presence of worm-embryos, and further work is necessary. A skin disease which occurs in cattle at Bali, and which is associated with necrosis of patches of skin and with mummification of the edges of the ears, was suspected to be comparable with fagopyrism.

A chorioptic mange, affecting the mouth region, was observed in goats.

W. H. Andrews.

MUKTESAR. **Imperial Bacteriological Laboratory Report for Two Years ending March 31, 1924.**—1925. Calcutta. Govt. of India Central Publication Branch.

This report contains, apart from the usual statistical sections, a survey of a very considerable amount of research work done during the period under review, particularly in connection with rinderpest and haemorrhagic septicaemia. As detailed technical papers are promised it seems to be advisable to suspend abstraction until these papers appear.

BOOK REVIEW.

BLENKINSOP (L. J.) [K.C.B., D.S.O., Colonel-Commandant R.A.V.C.] & RAINEY (J. W.) [C.B.E.] [Edited by]. **History of the Great War Based on Official Documents. Veterinary Services.**— pp. x+782. With 9 plates & various charts, plans & diagrams. 1925. London: H.M. Stationery Office. [Price, £1 1s. net.]

Gratification and pride will, we imagine, be the feelings uppermost in the minds of members of the Veterinary profession as they reach the end

of this history, which records in some 750 pages the official services of the British veterinary profession during the Great War, services ably—often brilliantly—performed amid circumstances generally of difficulty and not seldom of hazard.

While we cannot share the optimism of those international pacifists who consider that the lamb is already showing a tendency to lie down beside—and outside—the lion, we still think our late experience will prove to be unique and one not likely to recur, both as regards the extent, and the varied nature, of the opportunities for service which the great occasion afforded.

Be this as it may, the Veterinarian of to-day can say, if evidence of past monumental service is required, " Circumspice."

Amid the records of the colossal wastage and destruction of war contained in this history it is with gratification that, here and there, one comes across a golden grain of extended knowledge or of ripened experience, an improvement in surgical technique, the delimitation of a fly-belt, or the successful application to a devastating disease of preventive measures, etc., etc.

Even so, one stands aghast at the toll of animal life exacted by this great war, and the mind is staggered by the mass of animal suffering and enormous economic loss implicit in such statement as "during their advances on the Canal their (the enemy) losses in camels alone were 45,000 " (p. 252), or with the Remount Commission in Canada " Died and destroyed before shipment, 42,261 " (p. 512), or " the total dead wastage from August, 1914, to November, 1918, was more than half-a-million animals " (p. 508).

When one adds the animal losses incurred by the other belligerents, such total is apt by its very magnitude to exceed our intelligent comprehension.

The death-roll in France alone amounted to 269,000 animals from 1914 to 1918.

Such figures for the French front were, we note, composed of wounds and disease in almost balanced proportions (131,000 deaths from wounds, and 138,000 from disease and debility).

This latter cause (debility), together with respiratory disease, would seem to have accounted for the great bulk of deaths from disease. Referring to the debility prevalent in 1917 the history says, page 514, " the fact that all animals had been kept clipped as a precaution against mange may have contributed to this disastrous occurrence." Such a statement seems one of much significance and tends to raise the well-worn controversy as to the protective utility of the horse's coat under conditions of active service.

That the removal of mud accumulations and epithelial débris is facilitated by clipping is undoubted, but if this gain in stable management involves the wastage—in circumstances of exposure—of animal heat, with a consequent loss of condition, wide-spread reduction of efficiency, or an actual state of debility, we may well doubt on which side the balance of advantage lies. That this removal of the coat is necessary as a precaution against mange appears to the writer unproven.

Previous to the Great War it was shown by a Natal worker as far back as 1910 that it was practically impossible to produce the disease in animals which had been dipped in an arsenical dipping fluid even when such animals were maintained for lengthy periods closely in contact with cases of advanced mange. If, therefore, the dipping-tank—or some equivalent apparatus—can be made available, it follows that the necessity for the removal of the coat as a mange precaution ceases to exist, and such an equivalent apparatus, designed and perfected by the same worker, was existent long before the outbreak of hostilities.

This spray-pen, as it is called, is operated with only 400 gals. of dipping fluid, as compared with the 3,500 gals. of the ordinary tank. Besides

being rapid and economical in use, the appliance is easily portable and much less costly than the immovable dip-bath. Debility owing to coat removal for mange should therefore be an avoidable equine trouble in future campaigns.

The respiratory disease which caused such grievous losses amongst remounts in the earlier phases of the war can also be counted as a thing of the past owing to a recognition of its causal factors.

While on the Western Front the above diseases were responsible for the great bulk of the disease loss ; tropical diseases proper exacted a heavy toll in other theatres of the War. In glancing down this long list of diseases the Trypanosomiases seem to have been responsible for the greatest loss, and it would seem that in no direction of tropical veterinary effort is further research so needed as in the production of an efficient trypanocide—such as of the Bayer type—rendering unnecessary the enormous physical task attending the destruction of the habitat of the various biting flies, or the extermination of the big game.

When we recall the ease with which an immunity can be secured by the use of an appropriate antitoxic serum against rinderpest, the losses from this disease would appear to have been more avoidable than those experienced from the various forms of trypanosomiasis. Time and facilities for the production of an active form of immunity against rinderpest are both generally wanting in a war of movement, but the complete temporary or passive immunity conferred by a single inoculation with well-prepared serum is sufficient for the prompt protection of in-contacts and the avoidance of extension from infected foci. The Laboratories at Nairobi, Muktesar, and Constantinople all did yeoman service in the supply of quantities of this serum, but it is evident from the losses incurred that much larger quantities could have been profitably employed. In times of urgency intelligent laymen can well be entrusted with work of this nature, thereby freeing the overworked veterinary officer for the far more important administrative work necessary to efficient control of this disease.

Horse-sickness caused considerable loss in the mounted units both of the South-West and East African campaigns, nor is evidence forthcoming in the history that the method of immunizing the horse against this disease has yet become usefully established. The use of smoke protection—smudges—the utility of which was first shown so clearly in Zululand in 1899, seems to have been the main system of protection adopted. The value of the arsenical dip in lessening the incidence of horse-sickness has been well demonstrated in the past, and in such cases the portable spraying apparatus mentioned above would have had its uses.

This same remark applies to the measures possible for the control of East Coast fever, which is stated to have been a most difficult disease to control in the East African campaign, owing—as with mange on the Western Front—to the absence of dipping facilities.

Previous Natal work had, however, shown that the tick, though attached to its host, is unable to infect before the expiration of 72 hours—an interval which affords ample time for its destruction by dipping or spraying—and that the process may be repeated at such short interval as to render infection theoretically impossible. The protection of ox transport while on trek seems, therefore to be attainable by the use of the travelling spray-pen, while *a fortiori*, in standing-camps and with slowly moving columns its proper use should ensure complete protection not only from East Coast fever, but in the avoidance or lessening of several other diseases.

Only the briefest enumeration is possible of such interesting maladies as latia, the poly-arthritis of camels, coccidiosis of sheep, or specific ophthalmia, etc. These and many other disease-conditions furnished ample opportunities for observation to our veterinary officers—ably reinforced in many cases by specialists in Hygiene, Entomology, etc., observations on horse-mastership, food-equivalents, camp sanitation, records of marching and working, food and water requirements under tropical conditions,

age in relation to endurance, poisonous plants, etc., these and scores of other such observations have enriched the sum of knowledge of our domestic animals in health and disease and their efficiency both in war and peace.

Never has the veterinary profession deserved so well of the British public, and never has its claim to consideration been so ably brought to prominence as by the authors of the Official History of the War.

The History is ably written, well illustrated, printed, and indexed. If one hopes at times for maps of locality and position to amplify the text one feels sure that responsibility for the omission cannot be laid to the charge of those who have collaborated so felicitously towards the production of this Official History of the War.

H. Watkins-Pitchford.